The Pan-Pacific Entomologist

Vol. XVI, No. 1 January, 1940

HENRY CLINTON FALL*

On November 14, 1939, the Pacific Coast Entomological Society lost by death one of its oldest and most distinguished members, Dr. Henry Clinton Fall. A charter member of the Society in 1901, chairman of its first meeting, vice-president from 1902 to 1910, and corresponding member from his retirement in 1917 until his death, Dr. Fall has left an indelible imprint on the organization and in the hearts of its members.

Dr. Fall was born in Farmington, N. H., on December 25, 1862, the son of Orin Tenny and Mary Anne Hayes Fall. He attended preparatory schools in Dover, N. H., and in 1884 graduated with the degree of Bachelor of Science from Dartmouth College. In 1929 he was honored by the further degree of Doctor of Science bestowed by his Alma Mater. His interest in insects began at a very early age and was encouraged and stimulated by his mother. It is said that at the age of sixteen years he had progressed to the state where he was considering the advisability of starting a pinned collection of insects. With his mind still undecided he captured a large longicorn beetle, *Prionus pocularis* Dalm., which influenced him in favor of the enterprise.

Dr. Fall's professional life was devoted to education, particularly in the field of mathematics. His career began in Illinois at the Chicago Manual Training School and was continued in California where he was head of the Science Department of Pasadena High School from 1896 to 1911. He came to this state in 1889 because of ill health and it was here that he gained recognition as a great Coleopterist. His first scientific article, "California Notes," appeared in the Entomological News for 1893 and was inspired by a visit from Dr. George Horn. It made known some observations on the habits and distribution of several species of little known southern California beetles. This article was followed in the succeeding years by one hundred and twenty-five or more papers, many of which were of a revisional

*Read before the Pacific Coast Entomological Society at its meeting of December 2, 1939.

or monographic nature and all of which were written on his own time, time which is wasted by many men. The best known of his revisions were those of *Apion* (1898), *Acmæodera* (1899), *Lathrididæ* (1899), *Ptinidæ* (1905), *Diplotaxis* (1909), *Pachybrachys* (1915), *Gyrinus* (1922), *Agabus* (1922), and *Hydroporus* and *Agaporus* (1923). Among his faunal works are several of special interest to western entomologists and to students of geographical distribution. These include his lists of the Coleoptera of the southern California islands (1897) and the Coleoptera of southern California (read before the Pacific Coast Entomological Society in 1901 and published by the California Academy of Sciences in the same year), as well as his reports on the Coleoptera of New Mexico (with Cockerell, 1907) and Alaska (1926). The latter report was published by the Society in the Pan-Pacific Entomologist.

The early work of Dr. Fall in southern California served as a stimulus for many western coleopterists, particularly Dr. E. C. Van Dyke, Dr. F. E. Blaisdell, Dr. A. Fenyes, Mr. Ralph Hopping, and Mr. J. O. Martin. These men were assisted by his careful determinations and reciprocated by providing much of the material upon which his early monographs were based. However, Dr. Fall, himself, was a good collector and field systematist. He collected in nearly all parts of the country at some time or other, but more especially in New England, Florida, California, and Alaska. He assembled what was, at the time of his death, the finest private collection of Coleoptera on this continent. It is said to have contained more than two hundred thousand mounted specimens representing some twenty thousand species and including about fourteen hundred types. These last were kept in separate boxes arranged in chronological order. All of his specimens were beautifully and carefully mounted, neatly labelled, and perfectly arranged, reflecting his methodical and systematic mind. The majority of the species had been determined by careful comparison with types, a fact which greatly enhances their value. Even while he was residing in California, Dr. Fall spent the majority of his summers in the East studying the type specimens of the species described by LeConte, Horn, and other early workers. After his retirement from active teaching in 1917, most of his time was spent in the study and arrangement of his

collection and in assisting others with determinations and type comparisons. His collection was left to the Museum of Comparative Zoology, where it will be housed near that of his great predecessor, Dr. LeConte. One of the things which Dr. Fall had long planned to do, and which now, unfortunately must remain undone, was the presentation to the California Academy of Sciences of a duplicate set of the numerous species which he described from this state. This action would have been of inestimable service to the western systematists and it is to be regretted that the plan was never consummated.

In addition to his more serious studies, Dr. Fall at one time or another, made collections of butterflies and of postage stamps. He was also fond of tennis and enthusiastic over parlor games, which he played with a good deal of skill. One of the older entomologists once recounted to the writer an incident which occurred at the Fall home in Pasadena. My friend, who considered himself quite skillful at cribbage, had been playing all evening without winning a game. Finally, in desperation, he exclaimed that Dr. Fall was inordinately lucky and that anyone could win who drew such excellent cards. With a smile, Dr. Fall suggested that they exchange the hands which they had just played and with which he had so easily won. They did so and once more he completely overwhelmed his opponent.

Although future generations of entomologists will place the name of Henry C. Fall beside that of John L. LeConte and George Horn as one of the greatest North American Coleopterists, he will be remembered by the members of the Society as a fine, scholarly gentleman, beloved by the older generation as a friend, colleague, and good companion on camping and collecting trips, and by the younger generation for the constant encouragement and patient help he so freely gave to all who asked.

Dr. Fall died at the age of 76 at the home of his sister, Mrs. Carl A. Richmond, at Tyngsboro, Mass., where he had resided since his retirement in 1917. Honorary pallbearers were Nathan Banks, William J. Starr, Frank A. Richmond, and Dr. W. M. Lougee. Active bearers were Dr. P. J. Darlington, R. W. Sherburne, C. H. Queen and R. C. Turner. He was interred in Pine Grove Cemetery, Farmington, N. H.—E. Gorton Linsley.

A NEW GEOPHILUS FROM SAN NICHOLAS ISLAND, CALIFORNIA

BY RALPH V. CHAMBERLIN
University of Utah

From Professor T. D. A. Cockerell I recently received for identification two chilopods collected on islands off the coast of California. A specimen taken on San Miguel Island by Anna Duszen is a female of *Ethopolys xanti* (Wood), a species widespread on the California mainland. The second specimen, taken on San Nicholas Island by Harry Allen, is a female of an interesting and apparently previously unknown species of *Geophilus*, which is described below.

Geophilus nicolanus Chamberlin, new species

Color of type specimen dark brown, the anterior segments and head, and the posterior segments lighter brown or fulvous. *Cephalic plate* very slightly wider than long, widest at middle; sides convex, the posterior margin straight or nearly so and the anterior margin convex. Frontal suture distinct. Median piece of labrum strongly sclerotized, dark in color, bearing five or six short conical teeth; the lateral pieces pectinate as usual. First maxillæ with telopodite of two articles; two external lappets well developed. *Antennæ* three times as long as the cephalic plate, with the ultimate article much shorter than the two preceding taken together. *Prebasal plate* not exposed, the cephalic plate overlapping the basal plate, the exposed portion of which is about three times as wide as long. *Prehensors* when closed equalling, or but slightly surpassing, the anterior margin of the head. Anterior margin of coxosternum forming a very obtuse reentrant angle, smooth, chitinous lines incomplete at anterior end. None of the articles dentate within. Claw stout, smooth. *Dorsal plates* bifurcate. Last plate somewhat shield-shaped, with posterior angle truncate. *Ventral plates* in anterior region decidedly wider than long. A few sternites preceeding the ultimate nearly as long as wide. Ventral pores across posterior border. *First spiracle* large, subelliptic, the second of similar form and size, the third much smaller, it and the following circular. *Last ventral plate* very wide, wider than long in about the ratio 15:8; sides convex, converging caudad, the caudal margin mesally incurved. Coxal pores numerous, arranged along and beneath the border of the ventral plate, twenty to twenty-four exposed on each side. Anal legs in the female slender, with the claw normal. *Anal pores* not visible. Sixty-three pairs of legs in female holotype. Length, 62 mm.

Locality: San Nicholas Island, California. One female collected by Harry Allen and transmitted by Professor T. D. A. Cockerell.

THE DIPTEROUS GENUS MICROPHORUS. I. PHYLOGENY

(Diptera Empididæ)

BY A. L. MELANDER

College of the City of New York

This paper is dedicated to Elizabeth Thompson, whose interest in science made possible the collection of many of the specimens enumerated herein. In 1922 the writer received a grant from the Elizabeth Thompson Science Fund for the purpose of studying the insects of Mount Rainier, in the State of Washington. With this assistance an extended trip was made with pack horses beyond the usual tourist roads. The alpine regions of Mount Rainier have been visited by the writer on six additional collecting trips, and on nearly every occasion specimens of *Microphorus* have been encountered. They are small black Empid flies, sometimes to be secured in great numbers by the sweeping net in the meadow slopes. Representatives mounted from many collecting localities along the Pacific slope when later examined proved to belong to several species, some of which were undescribed. The present study is an attempt to visualize the evolutionary development of this genus through an evaluation of the degrees of relationship of the several species to each other.

The genus *Microphorus* was erected in 1827 by Macquart, who then called it *Microphor*. In 1834 he corrected the name to *Microphorus*, giving its etymology as the little plunderer. Because the source of the term is thus the Greek *phōr*, spelled with the long omega, and not the commonly encountered *phŏr*, carry, which is spelled with the short omicron, the accent belongs on the penult, and the genus name is to be pronounced Mi-cro-phó-rus.

This genus has been confused in the minds of many. Of the American species which at one time or another have been referred to *Microphorus* the following assignments can be made. *Microphorus drapetoides* Walker is described in such general terms as to be unrecognizable; it may be an *Anthepiscopus*. *M. scapuliferus* Bigot, from Chile, has been placed by Collin in *Atrichopleura*, and Bigot's *M. semifulvus* in *Platypalpus*. In 1902 I used *Holoclera* in the sense of *Microphorus*. Coquillett, in his analysis of Empid genera in 1903, located in *Microphorus*

the diverse species *Anthepiscopus flavipilosus* Coquillett, *Anthepiscopus stentor* Melander, *Trichina atripes* Melander, *Euthyneura crocata* Coquillett, *Euthyneura aperta* Melander and *Sciodromia palliata* Coquillett; and transferred two typical species of *Microphorus*, *M. atratus* Coquillett and *M. sycophantor* Melander, to *Anthalia*.

It would seem from the confusion regarding the identity of *Microphorus* that the genus would be hard to recognize. That is not the case, for the species can be picked out at a glance. All our species are small, black-bodied and black-haired, with gibbous thorax, the males with large holoptic head and with the genitalia massive and curiously twisted to the right. Among the Empididæ they are set off by the small basal and anal cells of the wing. Because of their striking sex dimorphism it has been more difficult to associate females with their appropriate males than to place either in the genus. The allied genus *Microphorella* contains even smaller species, both sexes dichoptic, with pubescent eyes and with the anal angle of the wing greatly reduced.

Classification of the species within a genus may be presented as a visualization of the phylogeny of the group. While obviously nothing can be proved of the happenings of the past with regard to the actual origin of species, it is possible, by a study of correlated characters, to picture the groupings of species and their relations to each other.

Some characters, possessed in common by a series of species, may be regarded as ancestrally generalized; other characters, possessed by relatively few, may be considered to be recently specialized. Applying this working principle to *Microphorus* we see that *cirripes* (fig. 18) alone of all the species has the front femora of the male fringed with curled hairs. This unique fringe may therefore be regarded as a highly specialized character. Since *cirripes* further is the only species that possesses a much warped wing and has developed the bristle armature of the fifth ventral segment to the extreme, it is probable that *cirripes* is a very recently evolved species, measured by the wide terms of biological time. Other recent species, as indicated by the unique possession of specialized characters, are *bilineatus* which has two polished thoracic vittæ, *tacomæ* which has the seventh tergite polished, and *discalis* which has the largest discal cell in the genus.

Figs. 1 to 11, third joint of antenna and arista: 1, *M. obscurus;* 2, *obscurus* and *bilineatus;* 3, *ravus;* 4, *ravidus;* 5, *strigilifer;* 6, *evisceratus* and *isommatus;* 7, *cirripes* and *tacomæ;* 8, *sycophantor;* 9, *atratus* and *robustus;* 10, *armipes;* 11, *discalis.* Figs. 12 and 13, end of penis: 12, *robustus;* 13, *armipes.* Fig. 14, right lobe of fourth sternite, *evisceratus.* Fig. 15, right lobe of fifth sternite, *evisceratus.* Fig. 16, left lobe of fourth sternite, *isommatus.* Fig. 17, end of hind leg, *strigilifer.* Fig. 18, *M. cirripes.*

The figures are drawn freehand and therefore are to be regarded as diagrammatic.

A comparison of structures possessed in common by *cirripes* and any of the other species of *Microphorus* shows that *ravidus* and *strigilifer* are the closest relatives of *cirripes*. These three species form a group differentiated from the congeners by the structure of the middle legs of the males, which possess three strong femoral bristles and a distorted tibia, a correlation not to be found elsewhere in the genus.

Other index characters which show group relationship are the numerous minute acrostichal hairs of *obscurus* and *bilineatus*, and the bilobed and spinose fourth ventral segment of the males of *isommatus* and *evisceratus*. That these groupings are natural is further indicated by the correlation of other characters with the index characters mentioned. The numerous acrosticals developed only in the species *obscurus* and *bilineatus* are associated with a conical third antennal joint (figs. 1, 2), shortened style, piercing proboscis, clavate hind tibiæ and swollen hind metatarsi. The same combination of characters occurs also in the European species *anomalus*. All of our other species of *Microphorus*, all of which are limited to the western states, manifest a peculiar formation of the antennæ, the third joint becoming more or less constricted beyond its base and the style lengthening to an arista (figs. 3-11). This tendency to constriction reaches its culmination in *discalis*, where the distal part of the third joint is a strap-like elongation (fig. 11). Since constricted antennæ are distinctive of *Microphorus*, while the related genera have the conical form, it follows that the *obscurus-bilineatus-anomalus* group represents an ancestral condition, at least as concerns antennal structure.

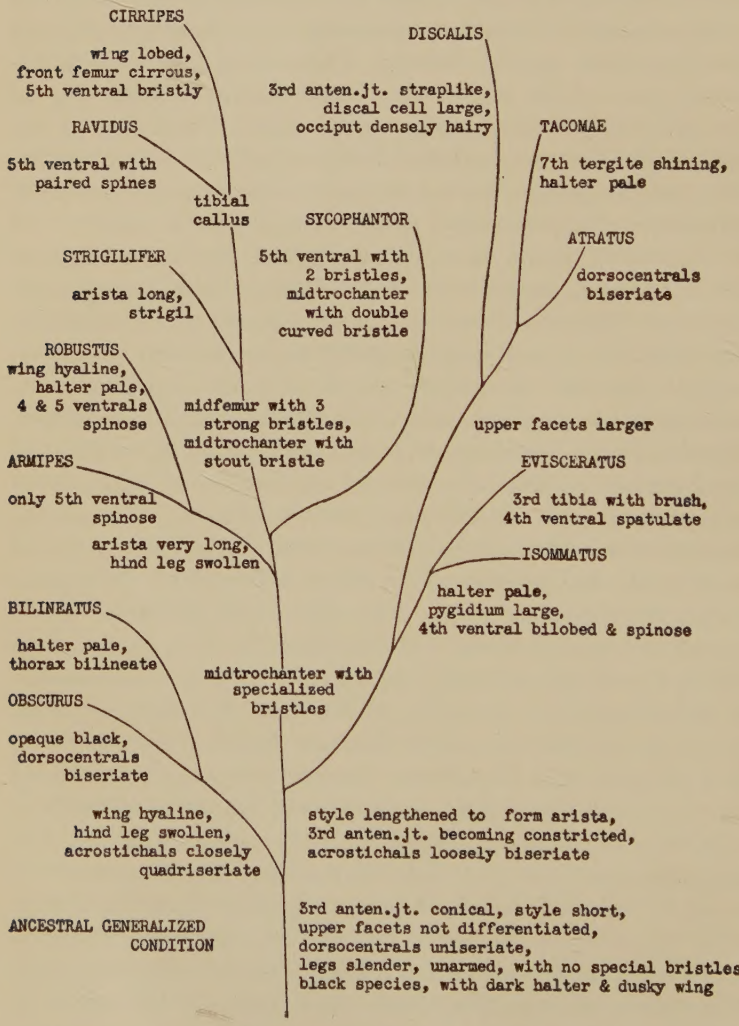
Secondary sexual characters are highly developed in the male of *Microphorus*. The genitalia are unusually large, distorted and always flexed to the right; the terminal abdominal segments often develop spines, or groups of bristles, or expanded plates; the legs may be distorted or swollen, and usually show some distinctive arrangement of stout blunt bristles not possessed by the females. Such departures from the conservative female structure may be regarded as specializations, and the greater the departure the higher the degree of specialization. When pictured as a phyletic tree the generalized species should form the lower and shorter branches and the specialized species should show the greater evolutionary growth.

It will be noted that in this genus there are certain tendencies which outcrop in various lines of ascent. The swelling of the hind legs of the archaic *obscurus-bilineatus* group is paralleled in *robustus* and *armipes*. There is a tendency in several species to transform the ventral hairs immediately in front of the pygidium into short spinous bristles. The nearly conical third antennal joint of the highly specialized *ravidus* is suggestive of the primitive conical antennæ of *obscurus*. Bleaching of the halteres has been accomplished independently in various species. Also, several species show the tendency to elongation of the discal cell, while others develop a curvature of the third vein.

Taxonomy always faces the problem of deciding what characters are homoplastic and what characters show genetic relationship. The parallelisms in the development of the structures mentioned in the preceding paragraph do not indicate a common origin. Personal interpretations vary with the individual entomologist to an extent that what might appear to be a natural identification key to one taxonomist might be considered an artificial key by another. The tabulation of the females of *Microphorus* as presented in the second paper of this series is not a natural classification. The species did not arise phyletically as listed in the table, nor are natural groupings indicated by the relative length of the sections of the fifth vein or the number of dorsocentral bristles and hairs. But the tabulation of the males probably has more genetic basis, made possible by a greater diversity of index characters displayed by this sex. In some species of this genus the males are more abundant than the females. With their ferocious and bloodthirsty natures, the males may display a rivalry, which may have been responsible for the spectacular array of secondary sex characters developed by this sex, and such characters have great value in the diagnosis of species. As to atavic index characters, first suggested by Osten Sacken in 1894, speciation in this small genus is apparently too recent to afford much use of such ancestral traits. Atavic indices are those inconsequential structures which have escaped the action of natural selection, and hence persist unmodified through the ages. The short style of the *obscurus-bilineatus-anomalus* group is an example of atavic index; but the stiffened bristle of the middle trochanters of certain males, while a group index indicating relationship, is too specialized a character to be considered an atavic index.

PLATE I

PHYLOGENY OF THE AMERICAN SPECIES OF MICROPHORUS


CIRRIPES
wing lobed, front femur cirrous, 5th ventral bristly
DISCALIS
3rd anten.jt. straplike, discal cell large, occiput densely hairy
RAVIDUS
5th ventral with paired spines
TACOMAE
7th tergite shining, halter pale
tibial callus
SYCOPHANTOR
ATRATUS
STRIGILIFER
arista long, strigil
5th ventral with 2 bristles, midtrochanter with double curved bristle
dorsocentrals biseriate
ROBUSTUS
wing hyaline, halter pale, 4 & 5 ventrals spinose
midfemur with 3 strong bristles, midtrochanter with stout bristle
upper facets larger
ARMIPES
EVISCERATUS
only 5th ventral spinose
3rd tibia with brush, 4th ventral spatulate
arista very long, hind leg swollen
ISOMMATUS
halter pale, pygidium large, 4th ventral bilobed & spinose
BILINEATUS
halter pale, thorax bilineate
midtrochanter with specialized bristles
OBSCURUS
opaque black, dorsocentrals biseriate
wing hyaline, hind leg swollen, acrostichals closely quadriseriate
style lengthened to form arista, 3rd anten.jt. becoming constricted, acrostichals loosely biseriate
ANCESTRAL GENERALIZED CONDITION
3rd anten.jt. conical, style short, upper facets not differentiated, dorsocentrals uniseriate, legs slender, unarmed, with no special bristles, black species, with dark halter & dusky wing

Showing the probable course of evolution in *Microphorus*, the stages at which specializations were introduced and the degrees of relationship of the various species to each other.

Microphorus affords good illustrations of the varying speed of evolution in developing different structures. *M. obscurus*, for example, possesses an archaic antennal structure coupled with modernized swollen hind legs. *M. evisceratus* has produced a most remarkable deformity of the abdomen while retaining the small ommatidia of its remote ancestors. The excavation of the hind metatarsus of *strigilifer* is undoubtedly a recent acquisition, geologically speaking, developed amidst the conservative pattern of the hairs of the legs. *M. strigilifer* shows a rudimentary deformity of the middle tibiæ of the male, which later developed into a pronounced callus in the species *ravidus* and *cirripes*. Comparing the three species, *strigilifer*, *ravidus* and *cirripes*, *strigilifer* would be rated as the most recent if the structure of the hind legs alone were used as the criterion; while its middle legs would indicate that it is older than either of the two other species. Judged by the front legs, *cirripes* is clearly the youngest species. An expansion of the wings near the middle of the hind margin might suggest a close relationship between *strigilifer* and *cirripes*, but this expansion is another instance of homoplasy, since it is only a superficial similarity, centering at the end of the intercalary vein in *cirripes* and at the end of the fifth vein in *strigilifer*.

(To be continued in next number)

SYNONYMY IN A CENTRAL AMERICAN HOPLIA

(Coleoptera, Scarabæidæ)

BY L. B. BOYER

Stanford University, California

The name *Hoplia argentata* Nonfried[1] is a homonym of *H. argentata* (*Scarabæus argenteus*) Geoffroy[2], a synonym of *H. cærulea* (*Scarabæus cæruleus*) Drury[3]. Moser has previously relegated *H. tricolor* Nonfried[4] into synonymy with *H. argentata*[5].

Inasmuch as *argentata* is a homonym of a name already used, the correct name of the species must be *H. tricolor* Nonfried.

[1]Nonfried, A. F., Deut. Ent. Ztschr. (1891), p. 259, 1891.
[2]Geoffroy, E. L. (in Fourcroy, A. F., Entomologia Parisiensis, 1:8, 1785.
[3]Drury, Drew, Illustrations of Natural History, 2:63, pl. 32, fig. 4, 1773.
[4]Nonfried, A. F., Berlin. Ent. Ztschr., 40:228, 1895.
[5]Moser, J., Stettin. Ent. Ztg., 79:338, 1918.

A NEW GENUS OF EMBIOPTERA FROM THE WEST INDIES

BY EDWARD S. ROSS

California Academy of Sciences

The following description is presented at this time to make the name available for use by Mr. Consett Davis of Australia in a paper to appear before my revision of the North American Embioptera, now in press. A fuller consideration, accompanied by illustrations of the characters of the component species will be included in this revision.

Genus Mesembia Ross, new genus

Oligotoma, Myers, 1928, Bull. Brooklyn Ent. Soc., 23:89.

Males: Winged; medium to large sized. *Head* with eyes large; mandibles small, short, apices acutely pointed, non-dentate. *Wings* large; venation oligotomoid; pigment bands broad, dark; hyaline stripes narrow, clearly, sharply defined. *Hind basitarsi* with but one bladder. *Terminalia* with tenth tergite divided sub-medially, each of the thus-formed hemitergites bearing distinct caudal process; process of hypandrium not prominent; left cercus two-segmented, the basal segment with an echinulate nodule on inner side; left cercus-basipodite not prominent, ventral. *Females*: No mature examples available for study.

Genotype: *Oligotoma hospes* Myers, ibid., fig. 1.

Distribution: West Indies.

The two-segmented echinulate left cercus in combination with the oligotomoid wing venation will distinguish *Mesembia* from all other known genera. Besides its type, *hospes* of Cuba, this genus also contains a new species from Haiti which will be described later.

Obituary Notices

Among the well-known and beloved members of the world entomological fraternity who have passed away during the year 1939, are: Walther Horn, Director of the Deutsches Entomologisches Institut, on July 10, 1939, at the age of 59; Commander J. J. Walker, editor of the Entomologist's Monthly Magazine, on January 12, 1939, at the age of 87; W. E. Britton, State Entomologist of Connecticut, on February 15, 1939, at the age of 70; H. H. Karny, versatile Austrian entomologist, on August 7, 1939, at the age of 53; and Royal N. Chapman, newly appointed dean of the Graduate School of the University of Minnesota, in November, 1939.—By R. L. Usinger.

NOTES ON SOME BUPRESTIDÆ OF SOUTHWESTERN OREGON

(Coleoptera)

BY FRANK M. BEER

Grants Pass, Oregon

During the winter of 1938-39 and the following spring and summer, a number of unusual Buprestidæ were taken in southwestern Oregon which may be of interest to collectors. Along with this, some observations were made on the habits of others, which, I believe, are worthy of mention.

The flora of the Rogue River Valley[1] is generally considered to be predominantly Californian. The mountainous country on the southern border of the valley is, topographically, a westward extension of the Sierra Nevada and Cascade ranges and their connection with the Coastal range. It is here that many of the semi-desert plants of the Sierra and Great Plain region gain entrance and extend into this area. Thus, with their host plants present, it is not surprising that a number of typical Californian Buprestids should be found here.

POLYCESTA CALIFORNICA LeC.

Though this species has been reported as common from southern Oregon and from a number of hosts, it is interesting to note that willow (*Salix sp.*), hitherto unlisted, is also one of its host plants.

ACMÆODERA PLAGIATICAUDA Horn

Although this species has not been reported from southern Oregon, it is not surprising to find that it occurs here. Two specimens were dug from manzanita (*Arctostaphylos viscida*) about two miles east of Murphy, Josephine County, Oregon. Later, two specimens were collected from the same host near Trail, Jackson County, Oregon. One was dug from a wood scar, the other was taken while feeding on a cluster of young leaves. The larvæ stay near dead wood and are generally found very close to the ground.

[1] Piper and Beattie, The Flora of the northwest Coast, p. iii.

Acmæodera connexa LeC.

During the middle of February while collecting in a burn that had occurred in the fall of 1931, seven adult specimens and a number of larvæ of this species were dug from the heart-wood of oak (*Quercus garryana*). The trees varied in size from about three to six inches in diameter and still had solid wood. The collection was made on Humbug Creek, two and one-half miles from Applegate, Jackson County, Oregon. Very little variation in markings was noted. At various times during the spring, specimens almost identical were collected near Grants Pass from one of our fire weeds (*Epilobium* sp.) and from a composite (*Monolopia major*) from Copper, on the upper Applegate River.

Acmæodera sinuata var. sexnotata Van Dyke

Five specimens of this unusual variety were taken in the valley; all were typical and showed little or no variation in markings. Two specimens were dug from chaparral (*Ceanothus cuneatus*), one being collected about two miles east of Murphy, Josephine County, Oregon, on an exposed hillside of the Applegate Valley, the other under identical conditions about one mile west of the city of Rogue River, Jackson County, Oregon. Later, three specimens were swept from the above reported host growing near Grants Pass.

Acmæodera angelica Fall

Fourteen specimens of this little Buprestid were collected at various places throughout the valley. Five were dug from the heart wood of chaparral (*Ceanothus cuneatus*), and others were collected in flight near, or swept from, the dead branches of the host plant.

Melanophila intrusa Horn

This is by no means a common species in our locality. It is found on pines which are dying, and usually only on trees that yet have a little life as shown by the fact that spring buds had developed a short distance. A number of specimens were observed on young fire-scorched pines, but none was seen on nearby trees which had been completely killed.

MELANOPHILA OCCIDENTALIS Obenberger

It seems surprising to find this species so far north, as Sloop[2] reports it only from California, recording specimens taken from Orange County. However, as reported by Van Dyke[3] and Linsley[4] and as shown by Sloop[5], these forms have a special sensory pit which makes them sensitive to acrid odors and fumes, and since they have been known to travel long distances to fires, etc., it is not really surprising that we should find the species here. As Sloop stated, the adults and larvæ were collected from oak. Both Oregon white oak (*Quercus garryana*) and California black oak (*Q. californica*) are hosts, as is also Madroña (*Arbutus menziesii*). I suspect that careful examination of our boxes of *Melanophila* would prove this species to be confused with *acuminata*, and that they may be rather widely distributed in our western region. The species can readily be determined by dissection of the genitalia.

MELANOPHILA CONSPUTA LeC.

The larvæ of this species are very common in the charred, fire-killed limbs of second-growth yellow pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta*). They are very common where the trees are scattering, as in the fringe type stand. Pupating insects have been found near the heart-wood of limbs in all cases. More recent observations have shown this species to be very common just after a fire, and they were observed to oviposit on both the trunk and limbs. However, no larvæ or pupating specimens have been found other than in the limbs.

CHRYSOBOTHRIS CYANELLA Horn

This is another little insect that is very common in our region, extending its range from the valleys to the summits of the Cascades and Siskiyous. Chamberlin[6] reports yellow pine (*Pinus ponderosa*) as the probable host, but the larvæ are found to inhabit the woody roots of the wild buckwheat (*Eriogonum nudum*) on which they are so often collected. There are numer-

[2] Sloop, K. D., Univ. of Calif. Publ. Ent., Vol. VII, p. 10, 1937.
[3] Van Dyke, E. C., Pan-Pacific Ent., Vol. III, p. 41, 1926.
[4] Linsley, E. G., Pan-Pacific Ent., Vol. IV, p. 138, 1933.
[5] Sloop, K. D., Univ. of Calif. Publ. Ent., Vol. VII, p. 2, 1937.
[6] Chamberlin, W. J., Catalogue of Buprestidæ of N. Amer., p. 145, 1926.

ous larvæ, but relatively few reach maturity because of a parasite which destroys over half the larvæ, or did so this past winter.

Chrysobothris dolata Horn

Two specimens, both males, were reared from a limb of Douglas fir (*Pseudotsuga taxifolia*) which was picked up at Prospect, Jackson County, Oregon. This is a new host plant for this uncommon insect.

Chrysobothris calcarata Chamberlin

Three males and a single female were collected on chaparral (*Ceanothus cuneatus*) near Wilderville, on the banks of the Applegate River. No females were known to Chamberlin[7] at the time he described the species. The female antennæ are coppery-bronze, serrate from the fourth segment and narrowing toward the tip; the first segment is as long as the next two combined as in the male. The upper surface is much less pubescent. The last ventral segment is rather completely rounded, similar to that of *C. harrisi* Hentz. The "wide smooth line running from the base to almost one-half way to the front" of the pronotum is not entirely constant in all cases, but with several specimens it can be determined. An odd act exhibited by this species is a unique way of flicking the abdomen as the insect crawls around on small twigs in the sun.

It is rather an unusual circumstance that this species should occur this far north since the type specimen was taken at Prescott, Arizona.

[7] Chamberlin, W. J., Pan-Pacific Ent., Vol. XIV, p. 12, 1938.

A Record of Physocephala affinis Williston as a Parasite of Adult Bembix comata Parker

The sand wasp, *Bembix comata* Parker, which nests in the sand flats at Emeryville, California, is frequently parasitized by the conopid fly, *Physocephala affinis* Williston, which can be collected nearby on sweet clover blossoms. The habits of the fly at this locality are similar to those recorded in a recent paper[1] for the same species as a parasite of *Bembix occidentalis beutenmuelleri* Fox.—By G. E. Bohart and J. W. MacSwain.

[1] Bohart, G. E., and J. W. MacSwain, 1939, Bull. South. Cal. Acad. Sci., 38:93-95.

NEW SIPHONAPTERA FROM CALIFORNIA

BY M. A. STEWART

University of California, Davis, California

Family PULICIDÆ

Anomiopsyllus congruens Stewart, new species

This species is apparently most closely related to *A. falsicalifornicus* Fox, 1929.

Head. Labial palpi slightly exceeding fore-coxæ in length and a trifle shorter than maxillary palpi. Frontal tubercle located high up on the frons. Frontal row composed of three bristles; one of which is located on anterior margin of antennal groove, one on oral margin and the third half way between the other two. Maxillæ subacutely pointed distally. *Abdomen.* First abdominal tergite with three dorsal teeth on each side. Second tergite with but one tooth on each side.

In other respects this new species is like the other known representatives of the genus except for the modified segments. *Modified Segments.* Male. Movable process of claspers convex on anterior margin and rather symmetrically proportioned; there is no distal dilation as in *A. falsicalifornicus.* Distally this process bears a more or less horizontal row of three closely set teeth which is less oblique and with the teeth not so widely separated from one another as in *falsicalifornicus* (Fig. 1). Also with a smaller tooth on proximal posterior margin. One apparently aberrent male in our series with a fourth very small tooth on the clasper located below the inner tooth and in this same specimen with the proximal tooth moved upwards. A row of fine bristles on posterior margin of movable clasper. Tip of manubrium acutely pointed and bent dorsad. Ninth sternite truncate at tip; possessing two prominent teeth at ventro-posterior angle and with a row of about seven bristles slightly more than half-way up the horizontal arm. Female. Stylet acutely pointed with one long apical bristle; about three times as long as broad at base. Substylar flap also acutely pointed and clothed with numerous long, fine bristles. Spermatheca with a spherical body and a relatively thick tail. Seventh sternite broadly and evenly rounded on posterior margin and quite constant in contour (Fig. 2).

The holotype, a male, and the allotype were collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Spilogale gracilis* subsp. on November 19, 1938, by R. Holdenreid. The paratypes consist of thirty-five males and thirty-five females, with the same data as the types, two females collected from *Pero-*

myscus californicus subsp. at the same place on December 17, 1938, and January 5, 1939, by the same collector and one male and six females from *Neotoma fuscipes* subsp. at the same place collected by C. P. North on June 20, 1938. The holotype and allotype are deposited in the author's collection.

Hoplopsyllus tenuidigitus Stewart, new species

This species is known only from male specimens.

Head. Labial palpus reaching to about three-fourths the length of fore-coxæ. *Thorax.* Pronotal ctenidium composed of sixteen or seventeen spines. Chætotaxy of metepisternum and metepimeron variable. *Legs.* Longest apical bristle of first metatarsal segment as long as second segment. Longest apical bristle of second metatarsal segment as long as third, fourth and fifth segments together. *Modified Segments.* Upper process of immovable claspers bearing eight long, stout and very closely-set bristles on dorsal and anterior margins. Lower process very long and slender, being nine and one-half times as long as broad at base. Distal tooth of this process nearly one-fifth as long as the entire process; very heavily chitinized and about as wide as the rest of the process. This latter process with four long, thin bristles on distal half of its posterior margin (Fig. 3). Movable process of the claspers inconspicuous and somewhat lanceolate in shape. Ninth sternite dilated distally, broadly rounded at apex and bearing a single stout, curved spine and several short, stout bristles. Manubrium short, stout, curved dorsad and cut at an angle at the tip.

The holotype, which is deposited in the author's collection, was collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Sylvilagus audubonii* subsp. on July 4, 1938, by C. P. North. Two male paratypes were taken at the same place from the same host species on July 4, 1938, and July 5, 1938, also by Mr. North.

Family Dolichopsyllidæ

Subfamily Ctenophthalminæ

Atheropsylla Stewart, new genus

Readily distinguished from other known Dolichopsyllidæ by the character of its genal ctenidium, which consists of two spines located on anterior margin of antennal groove just beneath vestigial eye and inserted one above the other in such a way as to be strongly overlapping and nearly parallel to one another (Fig. 4). Antennal groove extending very high up on occiput. No

frontal notch or tubercle present. Frontal angle located high up on frons. Labial palpi slender and five-segmented. *Thorax.* Pronotal ctenidium composed of about fourteen spines. *Abdomen.* Three rows of stout bristles on each of the first seven abdominal tergites. The two posterior rows extending below stigmata. Three antepygidial bristles present on each side in both sexes. *Legs.* Four pairs of lateral plantar bristles and one pair of proximal median ones on fifth tarsal segment of all legs.

Genotype: *Atheropsylla bakeri* Stewart.

Atheropsylla bakeri Stewart, new species

Head. Frons short, sharply angled dorsally and nearly vertical below the angle (Fig. 4). Lower frontal row composed of three bristles and upper row of two very small, fine bristles. Above and behind the eye, on margin of antennal groove, an additional long bristle. Labial palpi reaching nearly to end of forecoxæ. Maxillary palpi nearly as long as labial palpi. Occiput markedly indented above antennal groove. A patch of very small hairs back of antennal groove. One occipital bristle behind first antennal segment and another behind second segment. Above the former there is one smaller bristle and above the latter are three smaller bristles. *Thorax.* Pronotal ctenidium composed of thirteen or fourteen spines. Mesosternum, metepisternum and metepimeron heavily bristled but the number of bristles and their arrangement are inconstant. *Abdomen.* Third to seventh abdominal sternites with a posterior row of three bristles on each side of the body and in front of these one or two small bristles. No dorsal teeth on abdominal tergites. Upper antepygidial bristle of each group shortest and the middle one longest. *Legs.* An oblique row of small spinelets about half way up inner side of anterior margin of metacoxa. Longest apical metatibial bristle equaling first metatarsal segment in length. Longest apical bristle of first metatarsal segment extending to apex of second segment. Longest apical bristle of second metatarsal segment equaling third and fourth segments together in length. Longest apical bristle of third metatarsal segment reaching to about one-half the length of fifth segment. *Modified Segments.* Male. Movable process of claspers symmetrically digitate, its posterior margin bearing a conspicuous row of fine bristles. This process extends a considerable distance beyond immovable process (Fig. 5). Immovable process very broad. Manubrium extremely narrow and long. Ninth sternite broad and very broadly rounded at apex, possessing two spine-like bristles (the more distal of which is broken off in the holotype) on distal ventral margin. Remainder of ventral margin clothed with a row of fine bristles. Vertical arm of ninth sternite broad and dilated proximally. Female. Body of spermatheca roughly rectangular; tail long and dilated close to body

(Fig. 6). Bursa copulatrix heavily chitinized and strongly bent anteriorly. Stylet about five times as long as wide at base and with a long apical bristle. Posterior margin of seventh sternite deeply and evenly concave; its upper lobe acutely angled.

The holotype, a male, and the allotype, both of which are deposited in the author's collection, as well as three male and two female paratypes were collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Dipodomys venustus* subsp. on June 30, 1939, by C. P. North. Another male paratype was taken from the same host species in the same place by Mr. North, on June 12, 1938, and a female paratype from *Neotoma fuscipes* subsp. on June 20, 1938.

This new species is named in honor of the late Professor C. F. Baker, who was the first American siphonapterist.

Subfamily Dolichopsyllinæ

Foxella ignotus acutus Stewart, new subspecies

As would be expected, this new subspecies appears to be most closely related to *F. ignotus franciscanus* (Roths.), 1910.

Head. Lower genal row composed of three stout bristles; upper genal row with five bristles in the male and four in the female. Labial palpi extending to about three-fourths the length of fore-coxæ. There is one long bristle on the occiput behind middle of antennal groove. *Thorax.* Pronotal ctenidium composed of twenty spines. *Legs.* Longest apical bristle of first metatarsal segment as long as second segment. Longest apical bristle of second metatarsal segment extending to nearly one-half the length of fifth segment. *Modified Segments.* This subspecies is very readily distinguished from all other subspecies of *ignotus* by its modified segments. Male. Eighth tergite bearing about twenty-two stout bristles. Movable process of claspers long, slender and subacutely pointed at tip (Fig. 7). Immovable process of claspers somewhat conical in shape and extending slightly more than half way up the movable process. Ninth sternite long and both its anterior and posterior lobes bearing numerous bristles. Eighth sternite without a long apical or subapical bristle; however, with a distal clump of four stout bristles on ventral margin, anterior to which is another clump of four smaller bristles. Apex of eighth sternite symmetrically and acutely pointed; tip of vertical arm of this sternite evenly rounded and without an attenuated, dorsal projection. Female. Body of spermatheca spherical in shape and tail long and stout (Fig. 8). Stylet about twice as long as broad at base, acutely pointed, bearing a long apical bristle

and a somewhat shorter subapical one on ventral margin. Substylar flap heavily bristled. Posterior margin of seventh sternite of irregular outline in the dorso-posterior region (Fig. 8) and from there sloping regularly antero-dorsally.

The holotype, a male, and the allotype, both of which are deposited in the author's collection, were collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Thomomys bottæ* subsp. on May 26, 1938, by C. P. North. Only these two specimens are known.

Family HYSTRICHOPSYLLIDÆ

Atyphloceras longipalpus Stewart, new species

This species appears to be more closely related to *A. felix* Jordan, 1933, than to any other known representative of the genus.

Head. Labial palpi with more segments than in any previously described species: nine in the female and eight in one palpus and nine in the other in the male. These palpi extending beyond foretrochantera. Three rows of frontal bristles. Maxillary palpi nearly as long as labial palpi. Maxillæ long and acutely pointed. Frontal tubercle about even with anterior bristle of upper frontal row. *Thorax.* Pronotal ctenidium composed of twenty or twenty-one spines. *Abdomen.* Number of dorsal teeth on abdominal tergites (the two sides together) as follows: In the male, seven bristles on first tergite; ten on second; ten on third; eight on fourth; seven on fifth; and six on sixth. In the female, six bristles on first tergite; ten on second; eight on third; seven on fourth; eight on fifth; and two on sixth.

Aside from these characters and differences in the modified segments, this species is very similar to the other known species of the genus.

Modified Segments. Male. Both margins of movable process of claspers above pedicel slightly convex; apex bluntly rounded and posterior margin bearing four long bristles (Fig. 9). Immovable process cone-shaped and bearing eight stout bristles. Manubrium attenuated and acutely pointed. Horizontal arm of ninth sternite shaped somewhat like a bean-pod and bearing two short, stout, sharply pointed bristles on postero-ventral margin. Female. Spermathecæ very similar to those of *A. echis* Jordan and Rothschild, 1915, but with shorter tails (Fig. 10). Dilated portion of bursa copulatrix roughly rectangular in shape. Posterior margin of seventh sternite possessing a conspicuous ventral lobe broadly rounded at its upper angle and very slightly convex

at its posterior margin. Stylet two and one-half times as long as broad at base and only slightly narrowed at tip. Eighth tergite with eight spine-like bristles.

The holotype, a male, and the allotype (the only specimens known), which are deposited in the author's collection, were collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Spilogale gracilis* subsp. on November 19, 1938, by R. Holdenreid.

Atyphloceras felix Jordan

Atyphoceras [sic!] *felix* Jordan, Novitates Zoologicæ, 39:69, 1 fig., 1933.

Only the male of this species was described by Jordan. In his description it is stated that the labial palpus is seven-segmented. In our specimens the labial palpi of both the males and the females may have either seven or eight segments. We have in our collection twenty-two males and twenty-eight females collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, on *Peromyscus californicus* subsp., *P. truei* subsp. and *Microtus californicus* subsp. from June 18, 1938, to January 11, 1939. The female of this species is accordingly described below.

Head of spermatheca subglobular in shape and tail relatively stout (Fig. 11); thus closely resembling the female of *A. bishopi* Jordan, 1933. Dilated portion of bursa copulatrix shaped much like the pod of a bean, as in *bishopi*, but distorted at times in such a way as to give a somewhat triangular shape. Posterior margin of seventh sternite, in most of our specimens, with two well defined lobes; a lower one with a more or less straight margin rounded at upper corner and separated by a deep conspicuous sinus from the small rather acutely pointed upper lobe, this latter extending posteriorly nearly as far as lower lobe. Margin of this sternite variable, however. Upper lobe very sharply pointed in some specimens, rounded and much smaller in others and, in one specimen, lacking and thereby greatly resembling this segment in *A. longipalpus* Stewart. Eighth tergite with a vertical row of about six spine-like bristles, the lower four of which are very short. Stylet about three and one-half times as long as broad at base and only very slightly narrowed apically.

The allotype, which is deposited in the author's collection, was collected from *Peromyscus californicus* subsp. on June 18, 1938, by C. P. North.

Corypsylla setosifrons Stewart, new species

This species is described from a single female which is sufficiently distinct from all known representatives of the genus to warrant its description as a new species.

Head. Upper genal spine extending beyond anterior margin of antennal groove and broadly rounded at tip. Second spine about the same length as first spine (not longer as in *C. ornatus* Fox, 1908) and cut off obliquely at tip. Third genal spine slightly longer and also cut off at an angle at tip. Fourth spine longest, extending to prosternum, and greatly enlarged at tip which terminates in an acute angle. Fifth spine narrower than third and symmetrically pointed. Sixth genal spine as long as fifth; well defined and shaped much like a scimitar. With five bristles, rather than four as in *ornatus*, above upper genal spine. Also with five stout bristles on anterior margin of antennal groove. Labial palpus extending to four-fifths the length of fore-coxæ. Dorsally on each side of occiput with a somewhat oblique row of three bristles and a more posterior slightly oblique row of four bristles. With one conspicuous bristle back of basal segment of antenna and two bristles, the anterior of which is the smaller, posterior to club. *Thorax.* Pronotal ctenidium with sixteen normal spines and below it a continuation composed of nine shadowy spines on each side. Mesonotum very deeply concave on its ventral margin. Chætotaxy of mesothorax as in *ornatus.* Metepimeron bearing one anterior bristle and a row of four posterior bristles. *Abdomen.* Dorsal teeth on both sides of abdominal tergites as follows: First tergite, four teeth; second tergite, six teeth; third tergite, six teeth; fourth tergite, seven teeth; fifth tergite, six teeth; and sixth tergite, four teeth. Two bristles on second abdominal sternite, four on third, six on fourth, and six on fifth, sixth and seventh. *Modified Segments.* A vertical row of four bristles below antepygidial bristles. Eighth tergite bearing a vertical row of five bristles. With two horizontally arranged bristles on dorsal margin of eighth sternite. Posterior margin of seventh sternite curved concavely (Fig. 12). Spermatheca slightly vermiform and with the tail longer than body. Stylet long and cylindrical in shape.

The holotype, a female, which is deposited in the author's collection, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, on *Scapanus latimanus* subsp. on July 9, 1938, by C. P. North.

Trirachipsylla Stewart, new genus

Head. Easily distinguished from other known fracticipate fleas by the genal ctenidium of three spines, the more anterior

two of which overlap one another (Fig. 13). Two rows of frontal bristles with a large single bristle in between. Frontal tubercle present. Occiput bearing three rows of bristles. Eye present but lightly pigmented. Bristles of second antennal segment short. Maxillæ very acutely pointed. Last four segments of labial palpi short. *Abdomen.* First five abdominal tergites possessing dorsal teeth. With three antepygidial bristles on each side of abdomen. *Legs.* Hind coxæ heavily clothed with fine hairs in apical half. Bristles on posterior margins of tibiæ arranged in groups of twos and threes. With four pairs of lateral plantar bristles and one median pair between first lateral pair on fifth tarsal segments of all legs.

Genotype: *Trirachipsylla digitiformis* Stewart.

Trirachipsylla digitiformis Stewart, new species

Head. Posterior genal spine much narrower than the two overlapping anterior spines. Genal process acutely pointed posteriorly. Eye lightly pigmented. Lower genal row composed of three stout bristles; the upper one of which is located above the eye. Upper genal row with five bristles. With a long, heavy bristle immediately below next to the upper bristle of the upper genal row and between the two genal rows. Occiput bearing three rows of bristles. Along posterior margin of antennal groove, extending from base of second antennal segment to apex of the groove, a thickly set row of very minute spine-like bristles. Maxillæ long and drawn out to a very fine point. Labial palpi five-segmented, strongly chitinized and extending to about two-thirds the length of fore-coxæ. *Thorax.* Pronotal ctenidium composed of sixteen spines, in front of which is a row of about ten long, stout bristles. Chætotaxy of metasternum, metepisternum and metepimeron variable. *Abdomen.* Bristles on abdominal tergites relatively long and stout. Arrangement of dorsal teeth on abdominal tergites as follows: Male, seven teeth on both sides together on first tergite, seven on second tergite, five on third tergite, six on fourth tergite, and two on fifth tergite; female, six teeth on first tergite, seven on second tergite, five on third tergite, and two each on fourth and fifth tergites. *Legs.* No spinelets on inner sides of hind coxæ but the apical halves bearing numerous short, fine bristles. Four pairs of lateral plantar bristles and a median pair between the first lateral pair on fifth tarsal segments of all legs. Longest apical bristle of second metatarsal segment about as long as third and fourth segments together. With numerous stout, lateral bristles on metatibiæ. *Modified Segments.* Male. Movable process of claspers long and symmetrically digitate, bearing four conspicuous bristles at ventro-posterior angle. Upper two of these bristles stoutest (Fig. 14). Immovable process of claspers bilobed. Lower lobe bearing three very fine bristles. Upper lobe with one long, stout bristle with a smaller bristle and

a hair above it and a smaller bristle below it. Manubrium sharply pointed and curved dorsad at tip. Eighth sternite narrow with one large bristle about mid-way on ventral border, five spine-like bristles distally and a clump of four bristles anterior to the latter. Female. Spermatheca large; head subspherical and tail stout and obliquely cut at tip (Fig. 15). Seventh sternite not incised on its posterior margin, which slopes regularly anteriad. In one specimen in our collection this sternite is scalloped ventroposteriorly. Stylet long and tapering toward the tip which is cut off squarely; with one long apical bristle. Substylar flap clothed with a few stout bristles.

The holotype, a male, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Perognathus californicus* subsp. on November 9, 1938, and the allotype from the same host species at the same place on October 29, 1938, by R. Holdenreid. These are deposited in the author's collection. The paratypes consist of eighteen males and thirty females collected on *Perognathus californicus* subsp. from October 27, 1938, to December 7, 1938, and one female from *Peromyscus truei* subsp. on January 5, 1939. All of these paratypes were collected by Mr. Holdenreid at the Frances Simes Hastings Natural History Reservation.

Peromyscopsylla hemisphærium Stewart, new species

Head. Most of the specimens at hand have three spine-like bristles in the row of bristles on the anterior margin of the frons, but some have three on one side and four on the other and others have four spine-like bristles on each side of the head. Lower frontal row composed of three bristles, the middle row of two widely separated bristles and the upper row of two bristles located above frontal spine-like bristles. With two spines in genal ctenidium; the lower one extending farther posteriad than the upper. Labial palpus extending to about one-half the length of fore-coxæ. Maxillæ drawn out into a very fine point distally. *Thorax.* Pronotal ctenidium consisting of twenty-five or twenty-six (more commonly twenty-five) spines. With a row of about eight bristles anterior to pronotal ctenidium. *Abdomen.* The number of dorsal teeth on abdominal tergites variable but with teeth present on first five tergites. Posterior row of bristles on each abdominal tergite extending below stigma. Males usually with three antepygidial bristles on each side of abdomen, but some with three on one side and four on the other and others with four on each side. When there are four antepygidial bristles on each side, the next to the upper bristle is by far the longest and the upper bristle is slightly shorter than the lower bristle. When there are three antepygidial bristles on a side, the middle bristle

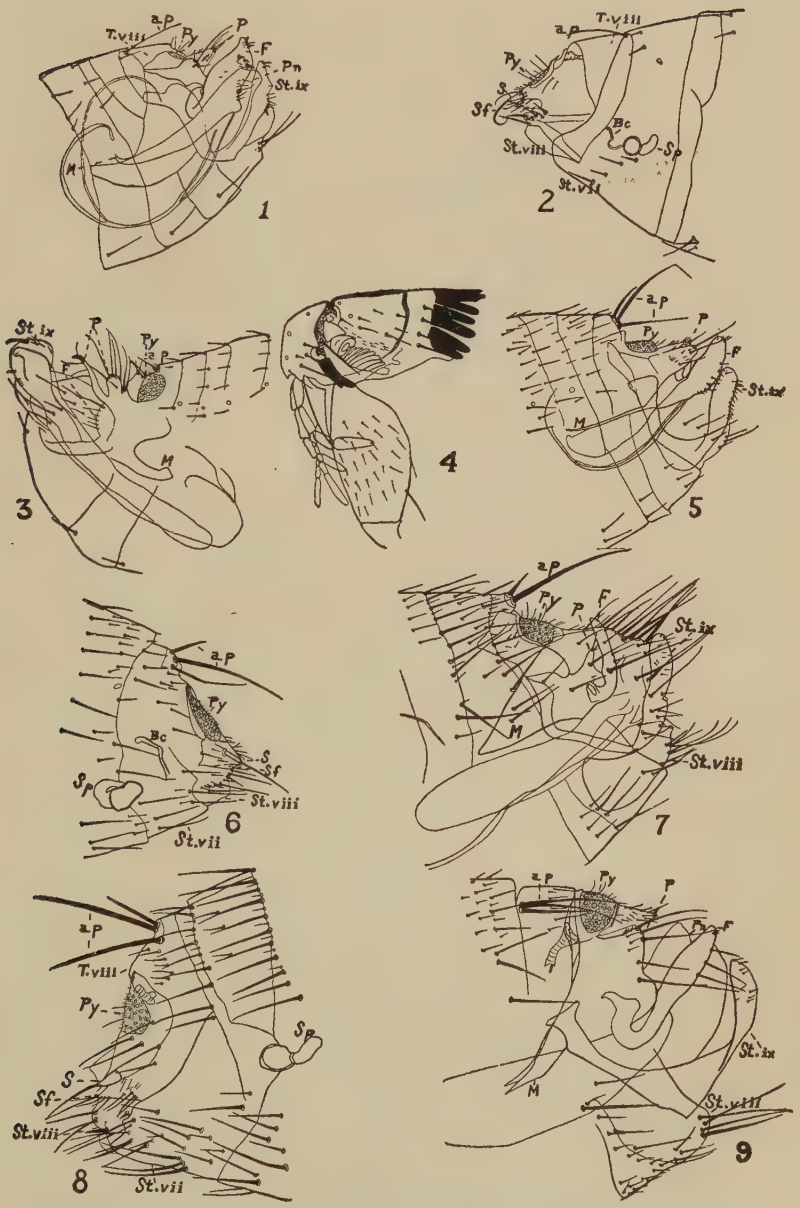
is the longest and the upper is the shortest. Females usually with four antepygidial bristles on each side but sometimes with three on one side and four on the other. *Legs.* Metatibiæ with three long bristles in dorsal comb. A pair of medianly placed bristles inserted between first pair of lateral plantar bristles on last tarsal segment of all legs. *Modified Segments.* Male. Movable process of claspers hemispherical in outline and bearing three long and three shorter bristles on posterior margin (Fig. 16). Immovable process broadly rounded anteriorly and reaching to apex of movable process. Ninth sternite narrow and sharply curved dorsad at tip, which is acutely pointed; bearing very numerous fine bristles on ventral margin. Vertical arm of this sternite with an acute anterior process in its upper third and terminating proximally in a sharp point. Manubrium long, straight and slender and greatly narrowed towards the tip. Female. Stylet about twice as long as broad at base; narrowed towards apex and with one long apical and one ventral subapical bristle. Substylar flap very heavily bristled ventro-posteriorly. Head of spermatheca elliptical and tail long and vermiform (Fig. 17). Bursa copulatrix with a bulbous termination. Eighth tergite bearing a vertical row of four spines. Posterior margin of seventh sternite variable in outline; most of our specimens with a semi-rounded ventral lobe and a deep regularly concave sinus separating it from a prominent evenly rounded upper lobe. Occasionally this sternite is not posteriorly incised at all and in one specimen the ventral lobe has a prominent, triangular, almost tooth-like, projection on its upper part.

The holotype, a male, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Peromyscus truei* subsp. on January 10, 1939, and the allotype from the same place and same host species on January 5, 1939, by R. Holdenreid. The paratypes consist of sixteen males and twenty females taken from *Peromyscus boylii* subsp., *P. californicus* subsp., *P. truei* subsp., *Microtus californicus* subsp., and *Reithrodontomys megalotis* by Mr. Holdenreid and C. P. North at the Frances Simes Hastings Natural History Reservation.

The author is indebted to Dr. J. M. Linsdale, who is in charge of the research work being conducted at the Frances Simes Hastings Natural History Reservation, for submitting the specimens described above.

LEGEND FOR FIGURES

Ap—antepygidial bristles; Bc—bursa copulatrix; F—movable process of claspers; M—manubrium; P—immovable process of claspers; Pn—penis; Py—pygidium; S—stylet; Sf—substylar flap; Sp—spermatheca; St.vii—seventh sternite; St.viii—eighth sternite; St.ix—ninth sternite; T.viii—eighth tergite.



Figs. 1 and 2, male and female, *Anomiopsyllus congruens*, n. sp.; 3, male of *Hoplopsyllus tenuidigitus*, n. sp.; 4 and 5, male, and 6, female, *Atheropsylla bakeri*, n. sp.; 7 and 8, male and female, *Foxella ignotus acutus*, n. subsp.; 9, male of *Atyphloceras longipalpus*, n. sp.

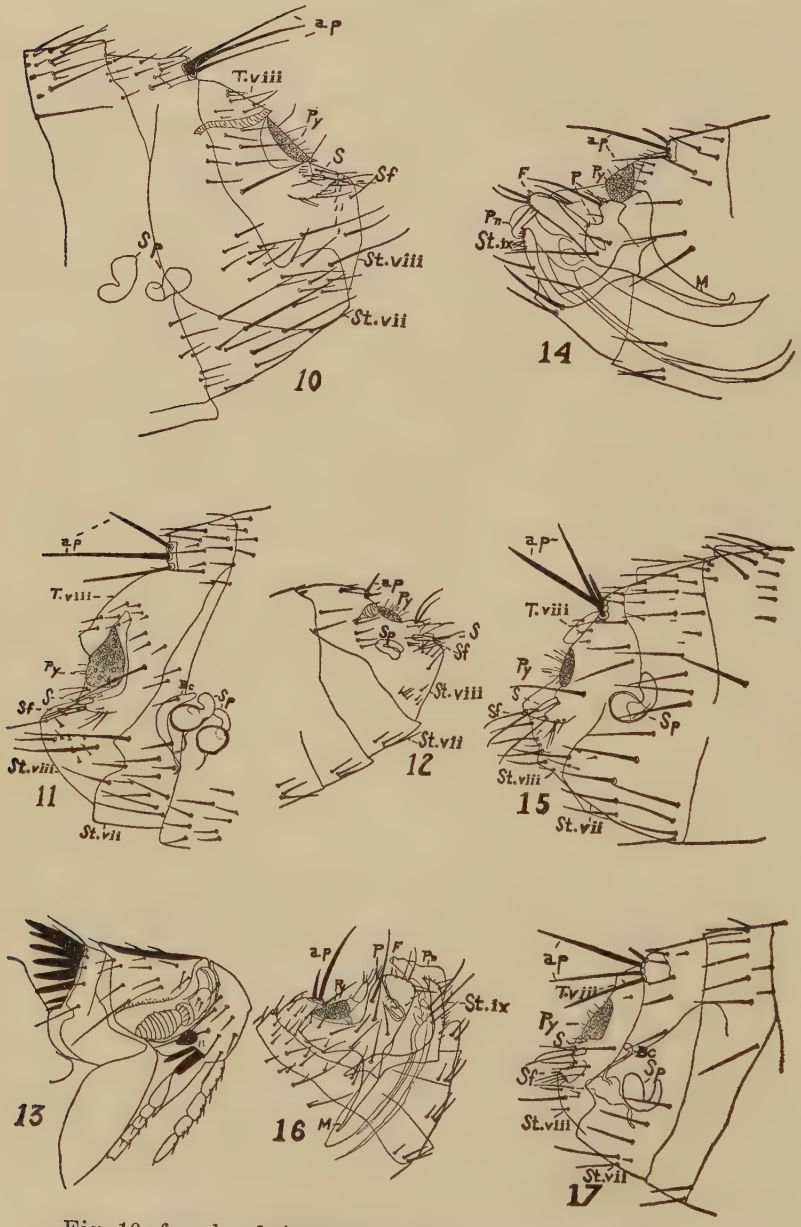


Fig. 10, female of *Atyphloceras longipalpus*, n. sp.; 11, female of *Atyphloceras felix* Jordan; 12, female of *Corypsylla setosifrons*, n. sp.; 13 and 14, male, and 15, female, *Trirachipsylla digitiformis*, n. sp.; 16 and 17, male and female of *Peromyscopsylla hemisphærium*, n. sp.

GYMNALEURODES, A NEW GENUS OF ALEYRODIDÆ FROM CALIFORNIA

(Homoptera)

BY W. W. SAMPSON AND E. A. DREWS

University of California, Berkeley

Gymnaleurodes Sampson and Drews, new genus

Pupal case elliptical to subovate in outline; margin of the case crenulate, the submarginal area not separated from the rest of the body. Several rows of tooth-like structures found behind the margin, the outer twice as long as the inner. Dorsum without papillæ or pores. Vasiform orifice cordate; the operculum transversely elliptical, filling about one-half of the orifice. Lingula spatulate, with distal extremity exposed beyond operculum, lobed and without spines. No caudal furrow present. Marginal fringe consisting of numerous glass-like rods. Abdominal spines not over four.

Genotype: *Gymnaleurodes bellissima*, new species.

This genus differs from *Aleyrodes*, in that the margin of the pupal case is not crenulated in the same manner, the operculum is not of the same shape; also the shape and spination of the lingula differ. In addition this genus is somewhat like *Trialeurodes*, except that there is no elevation of the case. There are no pores or papillæ, no caudal furrow, and no notch at the posterior edge. There is some resemblance to *Pealius*, but the operculum is not of the same size and shape; there is no caudal furrow, the vasiform orifice and lingula are not of the same form.

Gymnaleurodes bellissima Sampson and Drews, new species

Pupal case. Case laterally constricted cephalically, with a slight inward indentation at caudal end. Color of case a dirty yellow, with some pale reddish-brown markings on dorsum; color much more clear and striking in live specimens. Specimens parasitized by fungi slightly darker in appearance. No indication of wax on dorsum. Dorsum imbricated, particularly toward the edge, irregularly toward the top, more regularly toward the edge. Cephalothorax laterally constricted, rounded in front. Four irregular rows of small pores or setæ on abdomen, with a group of three pores concentrated cephalically and laterally on each side of vasiform orifice. Vasiform orifice cordate, with anterior margin straight; about twice its length from posterior margin. The hair on each side of the orifice about one and one-half the diameter of its base away from the orifice; length of hairs approximately one-quarter the width of orifice. Lingula usually with three lobes on

each side; apparent projection of tip of lingula due to transverse fold caudad of third lobe of lingula. Two rows of teeth found behind the margin. Ten dentations to 0.1 mm. of margin. First row of teeth projecting over syncline of crenulations; second row of teeth over syncline of first row. Marginal fringe of shiny crystaline rods about one-half the width of pupal case. Rods of the marginal fringe thicker and appearing white at 3 points, the first being at central posterior area and the other two located at middle of sides of thorax. Pupal case closely applied to host; dorsum only slightly elevated. Width of pupal case 0.9 mm.; length 1.15 mm.

Adults: Not known.

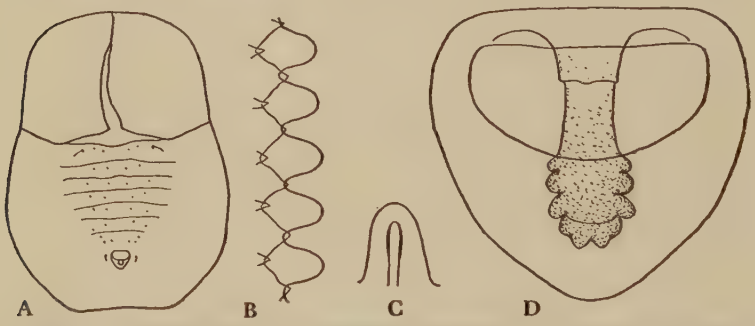


Fig. 1. *Gymnaleurodes bellissima* Sampson and Drews; a. pupal case; b. pupal case margin, 0.5 mm.; c. marginal dentation; d. vasiform orifice.

Host: *Quercus* sp., from the underside of the leaf.

Holotype, No. 4935, Calif. Acad. Sci., Ent., and nine paratypes mounted in balsam and four natural mounts in the authors' collections taken by E. A. Drews along the highway about one-half mile from the Orange County line in Carbon Canyon, San Bernardino County, California, January 10, 1939.

Anystis agilis Banks, a Predacious Mite on Eggs of the Artichoke Plume Moth

The large reddish mite, *Anystis agilis* Banks, is a common species on the globe artichoke (*Cynara scolymus* L.) in the Half Moon Bay area, where it preys on newly laid eggs of the artichoke plume moth (*Platyptilia carduidactyla* (Riley), many collembolans, and the artichoke aphis (*Capitophorus braggii* (Gillette). It is a well known and common predator, but its predacious habits on eggs of the plume moth were considered of unusual interest. I am indebted to Dr. H. E. Ewing for the determination of the mite.—W. H. Lange, Jr.

A NEW VELIA FROM PERU
(Hemiptera, Veliidæ)

BY C. J. DRAKE AND H. M. HARRIS

Iowa State College, Ames, Iowa

Velia willei Drake and Harris, new species

Large, rather elongate; brown, the hind margin of the pronotum yellowish, and the tips of all femora and basal portion of posterior tibiæ blackish. *Head* dark brown, with the usual impressed lines. Eyes blackish. *Antennæ* dark brown, moderately long; segment I rather stout, somewhat curved and enlarged distally, II faintly enlarged distally, stouter than the apical two; proportions, I:II:III:IV = 50:40:37:40. *Pronotum* slightly more than one-fourth longer than broad, the hind margin rather broadly rounded; coarsely pitted, with distinct median longtitudinal ridge, the humeri slightly raised and prominent. *Legs* moderately stout, the tarsi dark. *Connexivum* distinctly produced behind. *Rostrum* reaching to middle of mesosternum, the apex black. *Venter* brown with blackish markings, the last two segments longer than the preceding, the apical one broadly, roundly excavated. *First genital segment* above densely clothed with long blackish hairs. *Second segment* strongly sharply tumid behind, with a conspicuous tuft of black hairs on each side. *Clasper* long, curved, and tapered distally, the apex slightly twisted.

Length, 7.2 mm; width, 1.6 mm.

Holotype, apterous male, Santa Eulalia river, Peru, March 29, 1935, J. E. Wille collector; authors' collection.

Velia willei belongs to the *Velia inveruglas* Kirkaldy group of species. It is unique in that the genital segments are very hairy and the suranal plate lacks the hooks characteristic of most of the other forms. However, the two tufts of hairs on the suranal plate are curved and tapered and strongly resemble suranal hooks.

A NEW PIESMID FROM INDIA
(Hemiptera)

BY CARL J. DRAKE

Iowa State College, Ames, Iowa

The writer is indebted to the authorities of the Vienna Museum for the privilege of studying a small collection of Tingitoidea from India. A new species of Piesmidæ is described below.

Piesma distans Drake, new species

Moderately large, whitish cinereous. *Head* long, juga and tylus subequal in length. Eyes moderately large, dark. Ocelli small, reddish. Rostrum dark at apex, extending to intermediate coxæ. Middle and hind coxæ not widely separated, also placed closely together as pair. Rostral channel deep on prosternum and anterior portion of mesosternum, from there to apex strongly raised so as to form a ridge-like plate which is narrowed posteriorly and shallowly grooved. *Legs* short, stout, grayish brown. *Antennæ* moderately long, grayish brown; segment I short, very stout; II shorter and much more slender than I; III very slender, one-fifth longer than IV; IV considerably swollen, brownish. *Pronotum* deeply pitted, becoming smoky brown behind, the carina on each side of median line in front prominent; lateral margins becoming widely explanate anteriorly, three cells deep in front, the outer margin broadly curved; hind margin broadly curved. *Elytra* divided into areas as other long winged members of genus, the costal area uniseriate; membrane distinct. Scutellum small.

Length, 3.00 mm.; width, 1.80 mm.

Holotype (male) and allotype (female) Bombay, India, October 20, 1901, collected by Dr. Urei, Vienna Museum. Two paratypes, taken with type, Drake collection.

The pronotum is not very thick. The explanate lateral margins and carinæ are typical of members of the genus *Piesma* LeP. and Serv. The characters of the head, except the length of juga, are also typical of the genus *Piesma.* This is the first record of this genus in India.

NEW LEPTURINI

(Coleoptera, Cerambycidæ)

BY RALPH HOPPING

Vernon, British Columbia

The two new species herein described have been in my collection for some time and were given to me by Dr. R. D. Bird of Oklahoma and Mr. Kenneth M. Fender of McMinnville, Oregon.

Toxotus spinosus Hopping, new species

Male. Length 14 mm. Entirely black except the abdominal segments. Head with antennæ having the third segment longer than the fourth; eyes moderately prominent and punctation fine

and irregular; line of the cheeks behind the eyes straight. Pronotum much longer than wide; rather deeply, broadly impressed transversely both apically and basally; median longitudinal impression shallow and not smooth; surface rather finely and irregularly punctured, with lateral tubercles obtuse. Elytra subcostate, 3 mm. wide at the base, with apices obliquely truncate, length 9 mm. Vestiture golden, especially on margins, the abdominal segments rufo-testaceous, with very long tibial spurs.

Female. Length 17 mm. Differs from the male only in its larger size and stouter form.

Holotype, male, bearing the label "McMinnville. Ore., 5/9/36." Allotype, female, bearing the label "Oak Ridge, V-31-24, G. R. Hopping." Paratypes, three males from McMinnville, Oregon, two of which are in the collection of Mr. Kenneth M. Fender. Four other specimens are before me from Dayton, Oregon, which is not far from McMinnville, and Oak Ridge is in the same region.

This species is nearest *vestitus* Hald., but differs in having a much broader and deeper transverse sulcus at the apex of the pronotum, the vestiture golden instead of ashy, and the abdomen rufous or testaceous. It is also decidedly more slender, the antennæ are longer and the spurs on the tibia are very long, extending beyond the tibia by fully half their length.

Typocerus oklahomensis Hopping, new species

Male. Length 12 mm. Black with four yellow transverse elytral bands and with legs and abdominal segments rufous. Head rather coarsely punctate between the eyes, with rather long tufts of golden vestiture behind the eyes; antennæ with segment three longer than four and segments six to eleven with large poriferous areas. Pronotum convex, not inflated on the margins, finely punctured, disc covered with golden decumbent pubescence, apical transverse sulcus deep, basal transverse sulcus abrupt and with the usual denser vestiture. Elytra sparsely punctured with four yellow spots or bands, the base narrowly margined with black. Basal band not reaching the lateral margin, second and third nearly reaching the sutural and lateral margins, the apical becoming mere spots, apices obliquely truncate and emarginate.

Female. Length 12.5 mm. Differs from the male only in being slightly more robust, and with the second and third testaceous bands connected at the suture.

Holotype, male, bearing the label "Latimer Co., Okla., 12-VI-1931, R. D. Bird." Allotype, female, bearing the label

"Latimer Co., Okla., 15.VI-1931, R. D. Bird." Paratypes, six males and two females, all from Oklahoma and all collected by Dr. Ralph D. Bird. Paratypes are deposited in the collection of the Academy of Sciences in San Francisco, the Canadian National Collection, the University of Oklahoma and that of the author.

In the key to the *Typocerus* in Part I of "The Lepturini of America North of Mexico," *oklahomensis* comes near *brunnicornis* but the apices of the elytra and general appearance are more like *zebratus* and *badius* than any of the other species of *Typocerus*. *Oklahomensis* differs from these latter in the finely punctate pronotum, the disc of which is rather densely covered with golden hairs. It also has the testaceous marking of the base of the elytra in the form of a broad band. I have seen one specimen from Florida which seems to be this species.

STORED-GRAIN BEETLES IN WESTERN WASHINGTON WITH SPECIAL REFERENCE TO THE TENEBRIONID, CYNÆUS ANGUSTUS LeC.

(Coleoptera)

BY MELVILLE H. HATCH

University of Washington

On July 28, 1939, in a flour mill at Seattle, Washington, the following species of beetles were taken: *Necrobia rufipes* DeG., *Dermestes cadaverinus* Fab., *Læmophlœus* (*Cryptolestes*) *ferrugineus* Steph., *Læmophlœus* (*Cryptolestes*) *pusillus* Schön., *Cynæus angustus* LeC., *Tribolium castaneum* Hbst., *Tribolium confusum* Duv., *Tenebrio obscurus* Fab., *Tenebrio molitor* L., *Ptinus tectus* Boisd., *Sitophilus granarius* L., *Sitophilus oryzæ* L.

Of these, the *Necrobia rufipes* DeG. is not a normal inhabitant of the mill, having been released from an empty ship that had docked at the mill the previous day, having just carried a load of copra from the Philippine Islands to Mexico.

The most interesting find was the single specimen of the tenebrionid, *Cynæus angustus* LeC., taken in meal on the floor of the mill. This species is cited by Leng (Cat. Col. Am. n. of Mex. 1920, p. 234) from Arizona and California and, in addition, is represented in the collection of the United States

National Museum by specimens from Texas and Colorado (C. F. W. Muesbeck *in litt.*). In California it occurs about the base of yuccas, according to a letter from Dr. F. E. Blaisdell, to whom I am indebted for the identification of my material. My first Washington specimen was collected at Seattle, May 19, 1928, by a student. My attention was first directed to the species a decade later by a series of over 30 specimens taken in April, 1938, in a house in Seattle. At the same time a specimen was given to me by Mr. Joseph Bruzas, found about a log by one of his high school students at Bothell, just north of Seattle. Two specimens were collected by my students near Seattle in May, 1939, and a single specimen was taken in the laboratory at the University on August 1, 1939. Finally, I have a specimen secured at night at Naches in eastern Washington, July, 1939, in company with *Tenebrio molitor* L. and other night flying insects. In view of my twelve years' experience in collecting beetles in Washington, these records look as though we had to do with a recently introduced and rapidly multiplying species and one of possible economic importance.

The identification of this species among the Ulominæ is not difficult with the aid of Horn's key and descriptions (Tr. Am. Philos. Soc. XIV (II), 1870, p. 363-364, 369), where the failure of the hind angles of the pronotum to overlap the humeri apparently gets one by the second dichotomy. In the later revisions of this key (LeConte and Horn, Class. Col. N. A. 1883, p. 381; Bradley, Man. Gen. Beetles Am. n. of Mex. 1930, p. 192-193), however, the second dichotomy involves the base of the pronotum being "margined" or "not margined" and is invalid. *Gnathocerus*, *Cynæus*, *Tharsus*, *Alphitobius* (in part), and *Hypophlœus*, among those genera said to have the base of the pronotum not margined, possess a distinct margin, and *Eutochia*, in which the base of the pronotum is said to be margined, has one species (*picea* Melsh.) with it unmargined and the other (*crenata* LeC.) with it margined.

A noteworthy character of *Cynæus angustus* LeC., which it has in common with *Tharsus*, is the prominent canaliculation of at least the posterior portion of the elytral epipleuræ. In other genera in which the epipleuræ are abbreviated behind, they are either more or less flattened (*Uloma*, *Metaclisa*, *Eutochia*) or are narrow and vaguely canaliculate (*Hypophlœus*).

PACIFIC COAST ENTOMOLOGICAL SOCIETY

H. M. Armitage	E. G. Linsley	P. C. Ting
Vice-President	*President*	*Secretary*

Proceedings

One Hundred and Fifty-first Meeting, March 20, 1938.

Meeting held at 2 p. m. in the entomological laboratories of the California Academy of Sciences. The following members were present: C. D. Duncan, E. G. Linsley, A. E. Michelbacher, G. F. Ferris, E. O. Essig, E. R. Leach, E. C. Van Dyke, J. A. Downes, Karl D. Snyder, Albert R. Mead, W. H. Lange, C. D. Michener, G. E. Bohart, T. Aiken, D. D. Jensen, J. L. Gressitt, W. C. Reaves, D. P. Furman, I. McCracken, J. C. Chamberlin, J. B. Steinweden, F. M. Frost, E. Smith, A. Smith, W. Hovanitz, R. C. Dickson, K. L. Mæhler, G. R. Wilson, H. L. McKenzie, S. F. Bailey, M. Embury, R. M. Bohart, E. S. Ross, R. L. Usinger, M. A. Cazier, and W. M. Upholt. Visitors were present as follows: T. D. A. Cockerell, R. W. Chaney, N. W. Frazier, P. S. Lange, H. J. Rainwater, D. E. Howell, J. H. Freitag, A. D. Cameron, M. Clark, K. McKeehan, Mrs. T. D. A. Cockerell, R. K. Goodlive, J. R. Walker, W. Robinson, D. Tillotson, A. Bridge, E. Gehrhardt, H. B. Leech, F. B Herbert, N. Stahler, J. J. DuBois, W. W. Sampson, E. M. Drews, F. L. Blanc, E. E. Ivy, B. Walker, L. Phillips, and Mrs. E. C. Van Dyke.

The minutes of the previous meeting were read and approved.

After the transaction of business, Dr. Duncan announced that the program for the day was a symposium on Palæoentomology, and introduced the first speaker, Dr. Ralph Chaney, of the department of Palæontology, University of California.

Dr. Chaney spoke upon the fossil insect record. He emphasized the paucity of insect fossils and gave as reasons for the incompleteness of the record the following facts: (1) that deposition normally takes place only in the lowlands, (2) that the structure of many insects is unsuitable for preservation, and (3) that only certain types of rock are suitable for insect preservation. He pointed out that apparently ideal conditions prevailed at Florissant, Colorado, where the insects were preserved in deposits of fine ash. Dr. Chaney concluded with a few remarks upon the main gaps in the fossil record. The absence of insects prior to the Carboniferous he suggested might be due to the fact that the insects were developing in the uplands, or that they had not yet developed hard parts. The fact that so many of the Carboniferous insects which we know were aquatic was considered a false impression resulting from the type of deposition prevailing in that period. Dr. Chaney also pointed out that flower-loving insects are not evident until the Cretaceous although they must have existed long before that era.

After a general discussion of Dr. Chaney's remarks, Dr. Duncan introduced the second speaker, Dr. T. D. A. Cockerell, of Boulder, Colorado. Dr. Cockerell stated that insects were good horizon indicators and that the cockroaches of the various horizons of the Carboniferous were different. He also pointed out that except for a few interesting exceptions insects were not found in marine deposits. Among the fresh water deposits he considered Lake Florissant the finest and attributed this fact to the presence of some factor which killed insects in large numbers, possibly fumes from the volcano which deposited the beds of ash. Comparing the Miocene fauna of Florissant with that of the same area today, he emphasized the fact that there were no tachinid flies then, although they are very abundant now, that tipulids were equally abundant then and now, and that bibionids were far more numerous in the Miocene. Tsetse flies, now found only in equatorial Africa, occurred in Colorado at that time. In comparing the nearby Green River deposits with those of Florissant, he stated that certain moth-like fulgorids were abundant in the former locality but absent from the latter. Dr. Cockerell then concluded his remarks with an account of a visit to Œningen, where he collected some of the insects described by Heer.

Following a general discussion, Dr. Duncan introduced the last speaker, Prof. E. O. Essig, who spoke upon the Pleistocene deposits of California. Prof. Essig stated that in the La Bræa tar pits, most of the insects which had been recovered were beetles, among the most interesting of which were four genera of Carabids, including *Amara* and *Calosoma*, one species of *Dytiscus*, and a number of tenebrionids, among which were four species of *Coniontis* and nine species of *Eleodes*. Most of these beetles represent species still living today. At the McKittrick and Carpenteria deposits, Prof. Essig stated that water beetles and dragonflies prevail. The only truly fossil insect known from California is a dragonfly, which was collected by Dr. Chaney, and described by Cockerell, the two previous speakers. Prof. Essig concluded his talk with a number of stereopticon slides of the La Bræa and Carpenteria deposits as well as insects from these areas. Following the showing of the slides, the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-second Meeting, April 9, 1938.

Annual field meeting held at Alum Rock Park, Santa Clara County, California. Members present: C. D. Duncan, E. G. Linsley, H. E. Burke, R. C. Hackley, E. O. Essig, A. S. Smith, E. Smith, E. S. Ross, C. D. Michener, J. A. Downes, A. E. Michelbacher, and N. Stahler. Visitors present: Mrs. E. G. Linsley, Mrs E. O. Essig, A. Souza, A. Martoza, J. Walker, H. B. Leech, Mrs. H. B. Leech, J. W. Tilden, and E. Drews.

The group assembled at 10 a. m. and spent the remainder of the morning collecting along the sides of the Alum Rock Canyon. After luncheon about half of the members collected aquatic insects and the others spent the time in social discourse. Although the weather was delightful the season was not very far advanced and the collecting relatively meager.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-third Meeting, September 24, 1938.

Meeting held at 2 p. m. in the entomological laboratories of the California Academy of Sciences. The following members were present: C. D. Duncan, E. G. Linsley, B. E. White, E. P. Van Duzee, C. D. Michener, J. A. Downes, W. V. Pelle, E. L. Kessel, B. B. Kessel, P. C. Ting, J. O. Martin, F. E. Blaisdell, E. C. Van Dyke, E. R. Leach, A. E. Michelbacher, S. F. Bailey, H. H. Keifer, G. F. Ferris, E. S. Ross, R. L. Usinger, E. Smith, A. Smith, E. O. Essig, and J. B. Steinweden. Visitors were present as follows: N. Stahler, N. Roberts, P. Pennebaker, J. R. Walker, N. W. Stanger, K. Hagen, and N. E. Good.

The minutes of the previous meeting were read and approved.

Upon the recommendation of the membership committee the following persons were unanimously elected to membership in the Society: Dr. N. E. Good, Miss Ruth C. Whitney, Mr. J. J. DuBois, and Mr. Nathan Stahler.

Dr. Linsley reported for the editorial committee that Dr. Ferris, Dr. Blaisdell, and Prof. Essig had been renominated to succeed themselves as rotating members of the committee to serve until 1941. They were unanimously elected by the Society. Dr. Linsley also reported that it was the recommendation of the editorial committee that membership in the Society include a subscription to the Pan-Pacific Entomologist, that the treasurer of the Pan-Pacific Entomologist become the treasurer of the Society, that the annual dues for the Society be $3.00, and that members be billed at the same time as subscribers to the journal, rather than in September, as previously. After a general discussion of the matter, Mr. Martin put the recommendation in the form of a motion, it was seconded, and duly passed by the Society.

Dr. Van Dyke called attention to the death of Mr. George Wilson, a long-time, faithful member of the Society. Dr. Van Dyke reminded the group that for a great many years, through the kind efforts of Mr. Wilson, the Society had been enabled to hold its meetings in the offices of the State Department of Agriculture in the Ferry Building. Dr. Van Dyke suggested that a full report of his life be drawn up by someone who knew him well, for incorporation in the Society files. Dr. Duncan asked Mr. Ting to serve in this capacity for the Society. Mr. Steinweden pointed out that short accounts of Mr. Wilson's life had been published in the Pan-Pacific Entomologist, Journal of Economic Entomology, and Monthly Bulletin of the State Department of Agriculture.

Dr. Blaisdell exhibited some very fine drawings of genitalia of Tenebrionidæ. He pointed out that the genitalia offered characters of great phylogenetic significance and that a study of these structures revealed that our present classification of this family was unsound. The male genitalia divide the group into two main sections, and also offer characters useful in separating tribes. On the basis of female genitalia, Dr. Blaisdell stated that he was able to distinguish subgenera.

Dr. Ferris spoke of his recent trip to Chiriqui Province in Panama. He described the broad, densely forested coastal plain, the high savannah country behind the coastal plain, and the Volcan de Chiriqui, elevation 11,600 ft. On the summit of the volcano Dr. Ferris found many familiar northern plants, including *Lupinus, Ceanothus, Castilleia, Vaccinium, Berberis,* and *Arctostaphylos.* In conclusion, he stated that he had returned with a collection of about 450 scale insects, representing perhaps 200 species, a high percentage of which appeared to be new. In response to a question by Prof. Essig, Dr. Ferris stated that aphids appeared to be scarce in the tropics.

Mr. Keifer described his work on eriophyid mites, pointing out the apparently large fauna occurring in this State. He said that he had not yet discovered a satisfactory method for making good permanent mounts of his species.

Dr. Bailey spoke of his recent trip east in which he visited many entomological institutions and experiment stations and spent some time at Washington studying thrips.

Mr. Ting described a similar trip which he had made and spoke of his studies of coleopterous larvæ and weevils, particularly *Dyslobus.* He stated that his studies of both the adults and larvæ of the Rhinomacerini convinced him that this tribe belongs in the Anthribidæ, rather than in the Curculionidæ, near *Rhynchites.*

Mr. Downes reported on his eastern summer trip, which was designed primarily to meet the various entomological workers in the country. He spoke of his journey through the southwest to Florida, of visits to Harvard, Cornell, and the United States National Museum, and of an auto trip to Ottawa in the company of Dr. Snodgrass.

At the conclusion of Mr. Downes' remarks, the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-fourth Meeting, December 3, 1938.

Meeting held at 2 p. m. in the California Academy of Sciences in San Francisco, President C. D. Duncan in the chair. The following members were present: C. D. Duncan, E. G. Linsley, J. O. Martin, E. O. Essig, J. J. du Bois, E. S. Ross, K. D. Snyder, G. E. Bohart, H. M. Armitage, E. Smith, R. G. Pisano, F. E. Blaisdell,

N. E. Good, P. C. Ting, G. F. Ferris, R. E. Blackwelder, R. L. Usinger, D. D. Jensen, J. L. Gressitt, T. H. G. Aitken, W. W. Lester, A. Smith, A. E. Michelbacher, E. P. Van Duzee, J. A. Downes, E. C. Van Dyke, C. D. Michener, and Mr. and Mrs. C. H. Atkins. Visitors were present as follows: A. Mallis, S. Smith, J. P. Harville, G. Mansfield, A. Rabinovitch, R. P. Allen, B. E. Rees, J. W. Tilden, W. E. Simonds, J. D. Gilby, R. A. Smith, and W. Wheeler.

The minutes of the previous meeting were read and approved.

Mr. Usinger, speaking on behalf of the membership committee, recommended in view of long, faithful, and distinguished service to the Society that Dr. Edwin C. Van Dyke, Dr. Frank E. Blaisdell, and Mr. Edward P. Van Duzee be given honorary membership. The Society unanimously approved the recommendation although Dr. Ferris deplored the fact that the title was very inadequate to express the true gratitude, appreciation and respect which the organization feels toward these men.

The committee also recommended election to membership of Mr. William Simonds, Mr. Willis Wheeler, Mr. Adolph Rabinovitch, and Dr. Robert C. Miller.

Professor Essig announced with regret the resignation of Mr. Van Duzee after twelve years as editor of the Pan-Pacific Entomologist. He also announced that the Publication Committee had appointed Mr. Usinger as the new editor. Upon the suggestion of Dr. Linsley, the Society gave a rising vote of thanks to Mr. Van Duzee for his services.

Dr. Michelbacher presented to the Society's historical files a bound set of letters that he had received from Prof. Essig while the latter was in Europe. Dr. Duncan expressed the appreciation of the Society for this gift.

Prof. Essig reported the following nominations for officers for the coming year: President, E. G. Linsley; Vice-President, H. M. Armitage; Secretary, P. C. Ting, and Treasurer, E. R. Leach. The Society unanimously elected these men to office.

Dr. Duncan then turned the meeting over to the new officers and Dr. Linsley expressed the appreciation of the Society for Dr. Duncan's services as president during the past several years.

Dr. Linsley then introducd the speaker of the day, Mr. E. S. Ross, who gave an account of his recent automobile collecting trip through Lower California in the company of Dr. and Mrs. A. E. Michelbacher between June 13 and August 10, 1938. Using about one hundred natural color slides of scenery and plant life of the peninsula, generalizations were made on the geographic nature of the peninsula as well as travelling and collecting conditions. Of particular interest were the scenes of the Cape region, an area which had received abundant rains prior to the arrival of the

party. Here plant-life had taken on a spring-like activity with abundant green foliage and many blossoms. As would be expected, insects were secured here in greater numbers than elsewhere on the arid peninsula. About 3000 miles were traveled in Lower California, and nearly 50,000 specimens of insects were secured, many of which will be presented to the California Academy of Sciences.

Following Mr. Ross' talk, Dr. Van Dyke exhibited examples of *Brachypsectra* which had been taken on the trip and reviewed the interesting history of this rare group of beetles.

After a general discussion, the meeting adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-fifth Meeting, March 4, 1939.

Meeting held at 2 p. m. at the California Academy of Sciences in San Francisco, President E. G. Linsley in the chair. The following members were present: E. G. Linsley, H. M. Armitage, E. O. Essig, P. C. Ting, R. L. Usinger, G. F. Ferris, E. P. Van Duzee, C. D. Duncan, E. C. Van Dyke, E. R. Leach, T. H. G. Aitken, J. A. Downes, E. S. Ross, P. H. Timberlake, K. A. Salman, R. C. Miller, W. H. Wheeler, C. D. Michener, J. O. Martin, N. E. Good, W. H. Lange, Berta B. Kessel, E. L. Kessel, M. A. Embury, B. E. White, A. Rabinovitch, A. E. Michelbacher, R. G. Dahl, J. J. DuBois, W. W. Lester, A. C. Smith, D. D. Jensen, J. L. Gressitt, W. E. Simonds, J. B. Steinweden. Visitors were present as follows: J. Lamiman, D. Ilse, A. Mallis, E. A. Drews, Kiyoto Urin, W. Okamoto, Pauline Lange, L. Jeppson, Mrs. B. E. White, Helen Druecker and Phyllis Penebaker.

The minutes of the previous meeting were read and approved.

Due to the resignation of Mr. H. L. McKenzie, there was a vacancy in the Permanent Historical Committee and the President appointed Professor E. O. Essig to this position. A membership committee was appointed consisting of Dr. Stanley Bailey, Chairman, Dr. Carl Duncan, Dr. Robert Usinger and Mr. E. S. Ross. An annual field trip committee was also appointed with Dr. A. E. Michelbacher, Chairman, assisted by Mr. Charles Michener and Mr. Arthur Smith.

Upon the recommendation of the membership committee, Mr. K. S. Hagen and Mr. R. G. Dahl were elected to membership in the Society.

Preceding the main speakers of the day various members and visitors gave short discussions of entomological observations or research under way as follows: Mr. A. Mallis stated that the crazy ant, *Prenolepis longicornis*, is now established in California and is often found in high-story business buildings. Mr. E. S. Ross displayed an interesting collection of Histeridæ from gopher burrows including several new species and urged that more collecting

be done in such habitats. Mr. P. H. Timberlake, when asked to discuss his work on the genus *Perdita* of bees, stated that he had seventy-five species in manuscript, fifty of which are new to science. He said one hundred and fifty species are known now, primarily from the dry regions, in North America and estimated that from four to five hundred species probably exist in North America. Mr. George Bohart told of his recent studies of *Bembix occidentalis* subsp. *beutenmuelleri* and displayed parasitized specimens from Antioch, California. He gave the following observations concerning the parasites: a Bombyliid fly oviposits near the wasp's burrow, a Mutillid oviposits in the prepupa, and a Conopid fly oviposits in the adult wasp. Dr. E. G. Linsley spoke of Dr. Carl Duncan's recent paper on the Vespoid wasps.

The main talks of the day formed a Symposium on the Principles of Geographical Distribution, the first speaker being Professor G. F. Ferris. Professor Ferris spoke on distribution and systematics and pointed out that there are two approaches to the subject, namely, the relationship of systematic entomology to distribution and the relationship of distribution to systematic entomology. He stated that the distribution of plants and animals falls into patterns with differences due to the age of the groups and that these patterns can be used as a basis for systematic work. Professor Ferris suggested that a genus is not merely a concept but that it actually exists in nature and the included species are expressions of certain biological factors. He gave as an example, the 525 species of scale insects which have been placed by various authors in the genus *Aspidiotus* stating that after close study and making allowances for species transported commercially they break up into geographical patterns which are genera. Professor Ferris states that many factors must be considered before conclusions are formed as to the natural geographical patterns and generic relationships in the Coccidæ. Host distribution, the age of the group, and the distribution of related groups are all important factors.

Dr. E. G. Linsley spoke on the distributional views of W. D. Matthew emphasizing the following points from his theory: In geological time there has been an alternation of elevations and changes in climate but the ocean bottoms have remained permanent. At the present time a rise of six hundred feet would unite all continents into a single mass with the possible exception of Australia and a submergence of six hundred feet would isolate the southern continents. Matthew holds that the most advanced forms will be found in the locality of origin and the generalized forms will be found elsewhere. He suggests that environmental conditions migrate and the primitive species follow, while the remain-

ing forms are adapted or become extinct. Matthew also discusses the possibility of over-sea migration by means of natural rafts, pointing out that large masses of floating debris have been observed over one hundred miles away from the mouths of such large rivers as the Amazon and Ganges.

Dr. E. C. Van Dyke spoke on "Land Bridges." He pointed out that fossil insects are known from the Paleozoic era and that spiders existed in the Devonian era and it may be assumed that they lived upon insects. Insect fossil remains at present are too few to determine the exact locality of origin for any group. Fossil Mollusca are good indices for periods of geological history, but do not help much in land distributional studies. Dr. Van Dyke suggests that too great a significance should not be put on mammal records as insects existed long before mammals appeared. Geologic records show that the northern continents were connected during the Mesozoic era. South America had continental connections only for a very short time. During all of the Paleozoic and two-thirds of the Mesozoic the Panama region was submerged. Many generic groups are restricted to South America and migrated to North America during the Tertiary period. A migration of European species to Africa took place during the Pliocene. Dr. Van Dyke believes many small families and genera evolved in South America during the Mesozoic and have remained restricted there. Certain related genera, and occasionally related species, are found in the cave faunas of both the Pyrenees of Spain and in Kentucky.

Dr. Robert L. Usinger spoke on the Theory of Continental Drift. He pointed out that this theory is accepted more generally in Europe than in America. Professor Alfred Wegener in 1915 was the first to establish this theory, pointing out that only a slight readjustment is necessary to perfectly fit the opposite Atlantic shore lines of Africa and South America together. Dr. Usinger mentioned a recent book by A. I. Du Toit, "Our Wandering Continents," in which the author considers the absence of marine strata deposits in the east of South America, and in the west of Africa an indication of their being connected. Further evidence of land connection lies in the convincing fact that at least three different fault lines are continuous with each other when the shore lines of eastern South America and Western Africa are matched together. Dr. Usinger further pointed out that the southern tips of Australia, Africa, and India all show evidence of glaciation and that recent measurements of longitude show that the continents have moved during the last one hundred years. The distance moved is said to be greater than that of any probable error in measurements.

After a short discussion the meeting adjourned.—P. C. TING, Secretary.

One Hundred and Fifty-sixth Meeting, April 21, 1939.

Meeting held in the home of Mr. E. R. Leach at 8 p. m. Mr. Leach displayed his exceptionally fine collection of Lucanidæ of the world. A very enjoyable time was had by everyone present.

The following members were present: E. G. Linsley, P. C. Ting, R. L. Usinger, E. P. Van Duzee, E. R. Leach, W. M. Upholt, B. C. Cain, K. S. Hagen, R. G. Dahl, G. E. Bohart, E. C. Van Dyke, A. E. Michelbacher, E. O. Essig, J. J. DuBois, C. D. Michener, F. E. Blaisdell, Sr., and M. A. Cazier. The following visitors were also present: Mrs. F. E. Blaisdell, Sr., Mrs. E. C. Van Dyke, Mrs. E. P. Van Duzee, Bill Ferguson, Francis Mathews, W. F. Barr, Dorothy Lœwen, Virginia Leach, N. W. Stanger, Mrs. E. O. Essig, and Mrs. A. E. Michelbacher.—P. C. TING, Secretary.

One Hundred and Fifty-seventh Meeting, April 23, 1939.

Annual field meeting held at Mt. Diablo, Contra Costa County, California.

The following members were present: E. G. Linsley, P. C. Ting, E. C. Van Dyke, H. M. Armitage, E. O. Essig, R. L. Usinger, N. E. Good, E. P. Van Duzee, E. S. Ross, T. H. G. Aitken, M. A. Cazier, C. D. Duncan, and A. E. Michelbacher. Visitors were present as follows: Mrs. E. C. Van Dyke, Mrs. E. P. Van Duzee, Mrs. E. O. Essig, Mrs. H. M. Armitage, Jane Armitage, Kenneth Street, Mrs. A. E. Michelbacher, Betsy S. Schneider, Ernest Schneider, H. Graves, George Mansfield, J. W. Tilden, Dorothy W. Good, Henry Stabo, J. Gustafson, Mary Louise Zingheim, Dorothy Markwad, June Brubaker, Robert Brownscombe, Paul Jorgensen, Karl D. Snyder, Marie Pelletier, Mrs. P. C. Ting, Irwin Ting, Mrs. J. R. Douglas, J. R. Douglas, Mrs. E. G. Linsley, and S. E. Flanders.

Despite rather poor weather several rather rare insects were collected. Messrs. M. A. Cazier, E. S. Ross and T. H. G. Aitken were successful in taking two species of *Cremastocheilus* while digging in ants' nests. *Rhinomacer comptus* was collected on the staminate cones of digger pine by Dr. E. C. Van Dyke and *Nemocestes*, probably *montanus* Van Dyke, was collected crawling on the surface of shallow sandstone caves by M. A. Cazier and T. H. G. Aitken. This is the first record of the Curculionid genus *Nemocestes* occurring on Mt. Diablo.—P. C. TING, Secretary.

One Hundred and Fifty-eighth Meeting, September 30, 1939.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, President E. G. Linsley in the chair. Members present: E. G. Linsley, E. O. Essig, G. F. Ferris, R. C. Miller, C. D. Duncan, R. L. Usinger, E. P. Van Duzee, E. S. Ross, P. C. Ting, W. E. Simonds, A. C.

Smith, E. A. Smith, C. D. Michener, N. E. Good, F. E. Blaisdell, R. G. Dahl, W. H. Lange, T. H. Aitken, N. Stahler. Visitors present: E. J. Campen, R. Bartges, G. Mansfield, F. Driver, W. F. Barr, T. F. Kelley, S. R. Piazza, Elizabeth Truesdell, Florence Schultz.

The Society unanimously elected to membership the following: Mr. O. B. Cope, Mr. B. Brookman, Mr. J. W. Tilden, Miss Ernestine I. Smith, and Miss Marjorie Poff.

The program consisted of brief notes by various members of the Society on summer collecting, new publications, or research under way as follows:

Mr. E. G. Linsley exhibited volume I of the new Nomenclator Zoologicus by Sheffield A. Neave which includes a list of generic names used since the time of Linnæus.

Professor G. F. Ferris displayed drawings intended to accompany a morphological study of the Tipulidæ and called attention to need for such work. He mentioned similar studies which were under way on the Mecoptera and Neuroptera.

Professor E. O. Essig described the Yosemite Field School of Natural History with which he has been connected for ten years. The school is limited to twenty students and continues for seven weeks each summer. The first part of the course is devoted to general natural history and the latter part to some specialized ecological study generally at a high altitude. Dr. R. L. Usinger spoke on the conveniences of the school and the excellent opportunity provided for prolonged scientific work in otherwise inaccessible regions. Dr. Usinger made a particular study of the insect fauna of high Sierra lakes and also of the hemipterous genus *Platylygus*, the species of which are restricted to specific pines.

Dr. C. D. Duncan described a summer trip of the Nature Study School of San Jose State College to Mono County, California, where they studied the flora and fauna in some rather recent lakes formed in the bottoms of three different volcanic craters. He suggested that these conditions offered excellent opportunities for ecological studies. Dr. Usinger suggested that perhaps the age of the volcanic craters could be determined from Indian legends in that region.

Dr. F. E. Blaisdell reported on the longevity of the tenebrionid, *Cryptoglossa verrucosa*, which he had maintained for six and one-half years on a diet of rolled oats.

Mr. E. P. Van Duzee spoke of the Academy's recent acquisition of the Graham Hyde collection of butterflies from South Africa.

Mr. E. S. Ross, who assisted Dr. E. G. Linsley on the University of California summer 49 course at Idyllwild in the San

Jacinto Mountains, California, described the collecting conditions there and told of capturing the rare coccinellid, *Coccinella bridwelli* Nun.

Mr. C. D. Michener mentioned the following intertidal insects which occur at Half Moon Bay, California: A tipulid which oviposits at zero tide level with the resulting larvæ being submerged in salt water for several hours each day, a eurystethid beetle, several staphylinids and carabids, an ephydrid fly and several chironomids.

Dr. N. E. Good described the work of the U. S. Public Health Service on bubonic plague. They maintain four well equipped field trucks which cover all of the western states. All ectoparasites taken from rodents collected in the field are shipped to San Francisco where they are tested on guinea pigs for plague infection. Dr. Good reports that the following western states are infected with bubonic plague: California, Oregon, Idaho, Wyoming, New Mexico and Arizona.—P. C. TING, Secretary.

One Hundred and Fifty-ninth Meeting, December 2, 1939.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, President E. G. Linsley in the chair. Members present: E. G. Linsley, P. C. Ting, E. S. Ross, E. O. Essig, G. F. Ferris, F. E. Blaisdell, R. L. Usinger, E. R. Leach, E. P. Van Duzee, H. H. Keifer, D. Moulton, M. A. Stewart, C. D. Michener, T. A. Aitken, J. O. Martin, J. W. Tilden, L. B. Boyer, O. B. Cope, W. E. Simonds, B. Brookman, J. J. du Bois, G. E. Bohart, K. S. Hagen, R. G. Dahl, W. H. Lange, W. H. Wheeler. Visitors present: G. S. Manfield, E. J. Campan, N. W. Stanger, T. F. Kelley, T. E. Laningham, J. E. Hare, W. C. Ferguson, W. L. Swisher, D. D. Ahmad, L. W. Grabe, E. R. Nippress, A. M. Dunlop, Mrs. E. P. Van Duzee, C. C. Anderson, G. F. Smith, W. A. Fitschen, W. J. Perry, Florence Schultz, R. Bartges, P. Harvey.

Dr. E. G. Linsley announced the death of Dr. H. C. Fall and read a summary of the life of that great coleopterist. It was moved and seconded that the obituary be published along with a picture of Dr. Fall in the next issue of the Pan-Pacific Entomologist. It was also moved and seconded that the secretary write a letter of condolence on behalf of the Society to Mrs. Richmond, who is Dr. Fall's closest living relative.

The following were unanimously elected to membership in the Society: Dr. Paul Harvey, Mr. Rex Bartges, and Mr. John W. Johnson.

Dr. R. L. Usinger, editor of the Pan-Pacific Entomologist and Mr. E. R. Leach, treasurer, were called upon for their yearly reports.

Professor E. O. Essig announced the following nominations for officers for the coming year: President, E. G. Linsley; Vice-President, H. M. Armitage; Secretary, P. C. Ting; Treasurer, E. R. Leach. The Society unanimously elected these men to office.

President E. G. Linsley appointed a new membership committee consisting of Dr. C. D. Duncan, chairman; Dr. M. A. Stewart, and Mr. C. D. Michener. President Linsley also appointed a committee as follows to consider changes in the constitution: Professor G. F. Ferris, chairman; Dr. R. L. Usinger, and Mr. E. S. Ross.

President Linsley then called attention to Professor Essig's appointment to the Advisory Committee to the National Research Council; also that Professor Essig will participate in a symposium on the History of Entomology at the coming annual meeting of the Entomological Society of America which is being held at Columbus, Ohio, on December 27-29, in conjunction with the American Association for the Advancement of Science.

Mr. E. P. Van Duzee announced, after some discussion, that the entomological laboratories of the California Academy of Sciences will now be open on Saturday afternoons for social gatherings of interested entomologists.

Dr. C. D. Duncan exhibited a collection of very fine insect photographs taken by Mr. L. A. Brubaker of San Jose State College.

Mr. Dudley Moulton was the first speaker in a symposium on the subject of "Special Methods of Mounting for Temporary and Permanent Preservation of Insects." Mr. Moulton spoke on the technique for study and permanent preservation of Thysanoptera pointing out that the small number of specialists in the Order was due to the difficulty in mounting and studying such minute and delicate winged insects. Mr. Moulton uses an aspirating tube and beating sheet for collecting thrips. His specimens are killed in a solution of glycerin, alcohol, and acetic acid which keeps them pliable until permanently mounted in balsam. He stated that some of his balsam slide mounts of thrips are more than thirty years old and are in perfect condition. Mr. Moulton's slide collection is arranged in a most systematic manner and is being indexed and correlated by numbers with his library so that all his available material and literature can be brought together within a few minutes. He exhibited several remarkable microphotographs of thrips and several curious galls formed by these insects. Mr. Moulton has half of the slightly more than four hundred known genera of thrips represented in his private collection.

Professor E. O. Essig spoke on the permanency of paper used for insect labels and scientific literature. Many of the very old

books such as the works of Aldrovandus were made of linen rag paper and are still in excellent condition. Most of our literature today is printed on an inferior grade of paper which will probably disintegrate within a few hundred years. He mentioned that the University of California makes a practice of printing several copies of all their publications on the finest grade of linen rag paper. He also suggested the mounting of some of the old more valuable collections of pinned insects on slides to insure their permanency. He told of the success of the British Museum's attempts to remount the Walker collection of Trichoptera on slides. He mentioned the desirability of plotting the position of the type specimen on the slide label when several specimens are mounted on a single slide. Professor Essig houses his own collection of aphids in small boxes of twenty-five slides each. Only a single species is kept in each box which facilitates incorporating additional specimens. In this manner it is easy to insert a new box when needed in its proper phylogenetic place. His system is essentially the same as the unit tray system used for pinned insects. In comment, Dr. Ferris spoke of some advantages of the envelope system for filing slides and Dr. Miller exhibited Wistar Institute trays.

Dr. M. A. Stewart spoke on the technique used in mounting Siphonaptera. He believes that KOH is the only satisfactory agent for clearing fleas. He punctures the specimen on the midventral line to facilitate the penetration of the KOH. Dr. Stewart mounts his specimens in balsam, a single specimen to a slide, and houses them horizontally on modified Wistar trays. He called attention to the fact that in warm climates the specimens will drift in the mounting fluid, if the slides are stored in a vertical position.

Mr. H. H. Keifer spoke on the mounting technique for Acarina and Microlepidoptera. He stated that most of the difficulty in making permanent slide mounts of mites is due to their small size. Such minute species as most of the eriophyids cannot be run through several reagents without injury and loss of specimens. The most practical method is to mount them directly in a modified Berlese fluid. One of the ingredients, chloral hydrate, is a very good clearing agent, particularly when slightly heated, but is not a permanent mounting medium. Some of the larger mites can be cleared in KOH and treated in the usual manner. Mr. Keifer mentioned that some of the earlier workers, such as Nalepa and Hotchkiss, dismissed the difficulties of permanent preservation by discarding their specimens after they were described. In discussing Microlepidoptera he mentioned that it is not always necessary to spread their wings, but that it was important to empale them on minute pins soon after they are killed because they do not relax well.—P. C. TING, Secretary.